



**U.S. Department of Transportation  
Federal Highway Administration  
Western Federal Lands Highway Division  
Vancouver, Washington**



"Commitment to Excellence"

# **CONTRACT PACKAGE**

FOR

**ID PFH 50(9)**

**Avery Landing, St. Joe River Road**

March, 2012

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# Bid Schedule

Project: **ID PFH 50(9)**  
**Avery Landing, St. Joe River Road**

Insert a unit bid price, in figures, for each pay item for which a quantity appears in the bid schedule. Multiply the unit price by the quantity for each pay item and show the amount bid. Should any mathematical check made by the Government show a mistake in the amount bid, the Amount Bid for the item will be based on the Unit Bid Price.

When "LPSM" (Lump Sum) appears as a unit bid price, insert an amount for each lump sum pay item.

When a sum based on a fixed rate appears for any pay item in the amount bid column, include the Government inserted amount bid for the item in the total bid amount.

Total the amounts bid for all pay items and insert the total bid amount.

Pay Item No.	Estimated Quantity	Unit Bid Price	Amount Bid
15101-0000	MOBILIZATION		
	ALL	Lump Sum	\$ _____
15101-0000	STANDBY		
	5 DAY	\$ _____	\$ _____
15201-0000	CONSTRUCTION SURVEY AND STAKING		
	ALL	Lump Sum	\$ _____
15301-0000	CONTRACTOR QUALITY CONTROL		
	ALL	Lump Sum	\$ _____
15401-0000	CONTRACTOR TESTING		
	ALL	Lump Sum	\$ _____
20403-0000	UNCLASSIFIED BORROW		
	8,500 CUYD	\$ _____	\$ _____
20410-0000	SELECT BORROW		
	850 CUYD	\$ _____	\$ _____

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Pay Item No.	Estimated Quantity	Unit Bid Price	Amount Bid
20410-0000	SELECT BORROW (ROCK) 11,100 CUYD	\$ _____	\$ _____
30802-0000	ROADWAY AGGREGATE, METHOD 2 700 TON	\$ _____	\$ _____
40401-0000	MINOR HOT ASPHALT CONCRETE 300 TON	\$ _____	\$ _____
41201-1000	TACK COAT GRADE CSS-1, CSS-1H, SS-1, OR SS-1H 1 TON	\$ _____	\$ _____
60201-0000	36-INCH PIPE CULVERT 70 LNFT	\$ _____	\$ _____
63401-0100	PAVEMENT MARKINGS, TYPE A, SOLID (YELLOW) 2700 LNFT	\$ _____	\$ _____
63401-0100	PAVEMENT MARKINGS, TYPE A, SOLID (WHITE) 2700 LNFT	\$ _____	\$ _____
63501-0000	TEMPORARY TRAFFIC CONTROL ALL	Lump Sum	\$ _____
63509-1000	TEMPORARY TRAFFIC CONTROL, FLAGGER 80 FIX HR RATE	\$ _____	\$ _____
63610-2800	CONDUIT, 4-INCH, PVC 660 LNFT	\$ _____	\$ _____

**TOTAL**      \$ \_\_\_\_\_

Submitted by: \_\_\_\_\_  
Name of Bidder

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## Section 101. – TERMS, FORMAT, AND DEFINITIONS

**101.01 Meaning of Terms.** These specifications are generally written in the imperative mood. In sentences using the imperative mood, the subject, "*the Contractor*," is implied. Also implied in this language are "*shall*," "*shall be*," or similar words and phrases. In material specifications, the subject may also be the supplier, fabricator, or manufacturer supplying material, products, or equipment for use on the project.

Wherever "*directed*," "*required*," "*prescribed*," or other similar words are used, the "*direction*," "*requirement*," or "*order*" of the Contracting Officer or ERRS Response Manager is intended. Similarly, wherever "*approved*," "*acceptable*," "*suitable*," "*satisfactory*," or similar words are used, the words mean "*approved by*," "*acceptable to*," or "*satisfactory to*" the Contracting Officer or ERRS Response Manager.

The word "*will*" generally pertains to decisions or actions of the Contracting Officer or ERRS Response Manager.

**101.02 Specifications Format.** These specifications are divided into 10 Divisions.

Division 100 consists of general contract requirements for which no direct payment is made. The requirements contained in Division 100 are applicable to all contracts.

Division 150 consists of project contract requirements in support of Division 200 through 600 work. Work under Division 150 is measured directly or indirectly according to the Section ordering the work. When there is no pay item in the bid schedule, no direct payment is made.

Divisions 200 through 600 consist of construction contract requirements for specific items of work. Work under these Divisions is paid for directly or indirectly according to Subsection 109.05 and the Section ordering the work. When there is no pay item in the bid schedule, no direct payment is made.

Division 700 contains the material requirements for Divisions 150 through 600. No direct payment is made in Division 700. Payment for material is included as part of the work required in Divisions 150 through 600.

The first three digits of the item number in the Bid Schedule identify the Section under which the work is performed.

**101.03 Abbreviations.** Whenever these abbreviations are used in the specifications, they represent the following:

**(a) Acronyms.**

**AASHTO** — American Association of State Highway and Transportation Officials

**ACI** — American Concrete Institute

**ASTM** — American Society for Testing and Materials

**CFR** — Code of Federal Regulations

**CO** — Contracting Officer and all representatives

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**FAR** — Federal Acquisition Regulations (48 CFR Chapter 1)

**FHWA** — Federal Highway Administration

**FLH** — Federal Lands Highways

**ERRS** — Environmental Protection Agency Emergency Response Manager

**GSA** — General Services Administration

**ISO** — International Organization for Standardization

**ISSA** — International Slurry Surfacing Association

**MUTCD** — Manual on Uniform Traffic Control Devices (for Streets and Highways)

**NCHRP** — National Cooperative Highway Research Program

**NIST** — National Institute of Standards and Technology

**OSHA** — Occupational Safety and Health Administration

**SF** — Standard Form

**WFLHD** — Western Federal Lands Highways Division

**(b) Slope notation (vertical : horizontal).** For slopes flatter than 1V:1H, express the slope as the ratio of one unit vertical to a number of units horizontal. For slopes steeper than 1V:1H, express the slope as the ratio of a number of units vertical to one unit horizontal.

**101.04 Definitions.** The following definitions apply to this contract:

**Backfill** — Material used to replace or the act of replacing material removed during construction. Material placed or the act of placing material adjacent to structures.

**Base** — The layer or layers of material placed on a subbase or subgrade to support a surface course.

**Bid Schedule** — The prepared schedule included with the bid forms, containing the estimated quantities of items for which unit bid prices are invited.

**Clear Zone** — The portion of the roadside, including the shoulder, available for the safe use by an errant vehicle in which the driver may regain control of the vehicle. Recommended distances for the clear zone are in the AASHTO Roadside Design Guide.

**Commercial Certification** — See Subsection 106.03.

**Construction Limits** — The limits on each side of the project that establish the area disturbed by construction operations and beyond which no disturbance is permitted. Typically the construction limits are the same as the clearing limits, except when additional clearing is required.

**Contract** — The written agreement between the Government and the Contractor setting forth the obligations of the parties for the performance of and payment for the prescribed work.

**Contracting Officer (CO)** — An official of the Government with the authority to enter into, administer, and terminate contracts and make related determinations and findings. The term includes certain authorized representatives of the CO acting within the limits of their authority as delegated by the CO.

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**Contractor** — The individual or legal entity contracting with the Government for performance of prescribed work.

**Crashworthy** — A highway feature is crashworthy if it was successfully crash tested under the NCHRP Report 350, *Recommended Procedures for the Safety Performance Evaluation of Highway Features* or earlier comparable criteria or if it was accepted through analysis by FHWA, based on similarity to other crashworthy features. A list of crashworthy highway features is available on the FHWA Safety website.

**Cross-Section** — A vertical section of the ground or structure at right angles to the centerline or baseline of the roadway or other work.

**Culvert** — Any structure, not classified as a bridge, that provides an opening under the roadway.

**Day** — Each and every day shown on the calendar, beginning and ending at midnight.

**Density** — Mass per unit volume of material. Specific gravity multiplied by the unit mass of water.

**Detour** — A temporary rerouting of public traffic onto alternate existing roadways in order to avoid the work or part of the work.

**Diversion** — A temporary rerouting of public traffic onto a temporary alignment within the project limits in order to bypass the work or a portion of the work.

**Drawings** — Design sheets or fabrication, erection, or construction details submitted to the Government by the Contractor according to FAR Clause 52.236-21 Specifications and Drawings for Construction. Also refers to submissions and submittals.

**Government** — The Government of the United States of America.

**Highway, Street, or Road** — A general term denoting a public way for purposes of vehicular travel, including the entire area within the right-of-way.

**Holidays** — Holidays occur on the following days:

- 1<sup>st</sup> day of January - New Year's Day;
- 3<sup>rd</sup> Monday of January - Martin Luther King, Jr. Day;
- 3<sup>rd</sup> Monday in February - Presidents' Day;
- Last Monday in May - Memorial Day;
- 4<sup>th</sup> day of July - Independence Day;
- 1<sup>st</sup> Monday in September - Labor Day;
- 2<sup>nd</sup> Monday in October - Columbus Day;
- 11<sup>th</sup> day in November - Veterans Day;
- 4<sup>th</sup> Thursday in November - Thanksgiving Day;

- 25<sup>th</sup> day in December - Christmas Day;
- Other days declared holidays by the Congress or the President; and
- If a holiday falls on a Saturday, the preceding Friday is also a legal holiday. If a holiday falls on a Sunday, the Monday following is also a legal holiday.

**Layer** — See "lift."

**Lift** — Defined as follows:

(a) When placing and compacting soils and aggregates, a lift is any single, continuous layer of material that receives the same compactive effort throughout during a single work operation.

(b) When installing culvert pipe less than or equal to 48 inches in diameter, the backfill material placed on both sides of the pipe is considered to be contained in the same lift when the material is placed to the same elevation on both sides of the culvert, the compactive effort applied to one side of the culvert is the same as that applied to the other, and the compactive effort is applied to both sides of the pipe in a continuous operation.

**Material** — Any substances specified or necessary to satisfactorily complete the contract work.

**Maximum Particle Size** — The smallest sieve opening through which all particles in the material will pass.

**Measurement** — The process of identifying the dimensions, quantity, or capacity of an item. See Section 109 for measurement methods, terms, and definitions.

**Notice to Proceed** — Written notice to the Contractor to begin the contract work.

**Pavement Structure** — The combination of subbase, base, paving geotextiles, and surface courses placed on a subgrade to support and distribute the traffic load to the roadbed.

**Pay Item** — A specific item of work for which a unit and price is provided in the contract.

**Plans** — The contract plans furnished by the Government showing the location, type, dimensions, and details of the work.

**Production Certification** — See Subsection 106.03.

**Professional Engineer** — Engineers who hold valid State licenses permitting them to offer engineering services directly to the public, who are experienced in the work for which they are responsible, who take legal responsibility for their engineering designs, and who are bound by a code of ethics to protect the public health.

**Profile Grade** — The trace of a vertical plane intersecting a particular surface of the proposed road construction located as shown on the plans, usually along the longitudinal centerline of the roadbed. Profile grade means either elevation or gradient of the trace according to the context.

**Project** — The specific section of the highway or other property on which construction is to be performed under the contract.

**Right-of-Way** — Real property necessary for the project, including roadway, buffer areas, access, and drainage areas.

**Roadbed** — The graded portion of a highway prepared as a foundation for the pavement structure and shoulders.

**Roadside** — All area within the right-of-way excluding the traveled way and shoulders.

**Roadway** — In general, the portion of a highway, including shoulders, for vehicular use. A divided highway has two or more roadways. In construction specifications, the portion of a highway within the construction limits.

**Roadway Prism** — The volume defined by the area between the original terrain cross-section and the final design cross-section multiplied by the horizontal distance along the centerline of the roadway.

**Roller Pass** — One trip of a roller in one direction over any one spot.

**Shoulder** — The portion of the roadway contiguous to the traveled way for accommodation of stopped vehicles, for emergency use, and for lateral support of the pavement structure.

**Sieve** — See AASHTO M 92.

**Specifications** — The written requirements for performing work.

**Standard Forms** — Numbered forms issued by the General Services Administration for use as contract documents.

**Standard Plans** — Detailed plans approved for repetitive use and included as part of the plans.

**Station** — (1) A measure of distance used for highways and railroads. A station is equal to 100 feet. (2) A precise location along a survey line.

**Structures** — Bridges, culverts, catch basins, drop inlets, retaining walls, cribbing, manholes, endwalls, buildings, sewers, service pipes, underdrains, foundation drains, and other constructed features that may be encountered in the work.

**Subcontract** — The written agreement between the Contractor and an individual or legal entity prescribing the performance of a specific portion of the work.

**Subcontractor** — An individual or legal entity with which the Contractor sublets part of the work. This includes all subcontractors in any tier.

**Subgrade** — The top surface of a roadbed upon which the pavement structure, shoulders, and curbs are constructed.

**Substantial Completion** — The point at which the project is complete such that it can be safely and effectively used by the public without further delays, disruption, or other impediments. For conventional bridge and highway work, the point at which all bridge deck, parapet, pavement structure, shoulder, drainage, sidewalk, permanent signing and markings, traffic barrier, safety appurtenance, utility, and lighting work is complete.

**Suitable Material** — Rock or earth material that will provide stable foundations, embankments, or roadbeds, and is reasonably free of organic matter, roots, muck, sod, or other detrimental material. Suitable material may require drying or adding water, root picking, and other methods of manipulation before use. Suitable material includes the classifications of materials for which the project was designed.

**Superintendent** — The Contractor's authorized representative in responsible charge of the work.

**Surface Course** — The top layer or layers of a pavement structure designed to accommodate the traffic load and resist skidding, traffic abrasion, and weathering.

**Traveled Way** — The portion of the roadway designated for the movement of vehicles, including curve widening, exclusive of shoulders.

**Unsuitable Material** — Material not capable of creating stable foundations, embankments, or roadbeds. Unsuitable material includes muck, sod, or soils with high organic contents.

**Work** — The furnishing of all labor, material, equipment, and other incidentals necessary to successfully complete the project according to the contract.

## **Section 103. — SCOPE OF WORK**

**103.01 Intent of Contract.** The intent of the contract is to provide for the construction and completion of the work described. The precise details of performing the work are not stipulated except as considered essential for the successful completion of the work. Furnish all labor, material, equipment, tools, transportation, and supplies necessary to complete the work according to the contract.

**103.02 Contractor Records.** Upon request, provide records related to the contract to the Government for up to 3 years after final payment and for longer periods as provided by law.

Include a provision in all subcontracts at all tiers giving the Government the same rights as provided above with respect to the subcontractor's records.

## **Section 104. — CONTROL OF WORK**

**104.01 Authority of the Contracting Officer (CO).** The CO may delegate authority to representatives to decide on acceptability of work, progress of work, suspension of work, interpretation of the contract, and acceptable fulfillment of the contract. The term "*CO*" includes all authorized representatives of the CO, including the ERRS and inspectors, acting within the limits of their authority as delegated by the CO.

**104.02 Authority of Inspectors.** Inspectors are authorized to inspect all work including the preparation, fabrication, or manufacture of material for the project. The inspector is not authorized to alter or waive contract requirements, issue instruction contrary to the contract, act as foreman for the Contractor, or direct the Contractor's operations. The inspector has authority to identify non-conforming work until the issue can be referred to and decided by the CO or the ERRS. The inspector may take necessary action to prevent imminent and substantial risk of death or injury including stopping work.

**104.03 Specifications and Drawings.** Follow the requirements of FAR Clause 52.236-21 Specifications and Drawings for Construction.

Furnish as-built working drawings. The Government will provide one set of contract drawings to be used exclusively for recording the as-built details of the project. Use red pencil or red ink to record the information described below.

Note all additions or revisions to the location, character, and dimensions of the prescribed work shown on the contract drawings. Line out all details shown that are not applicable to the completed work. Check off details shown that were incorporated into the completed work without change.

Retain the drawings at the project site and, as work progresses, continuously update them to reflect the as-built details. Upon request, make the drawings available to the CO or ERRS to review for compliance with these specifications.

As a minimum, show the following types of changes on the as-built drawings:

**(a) Typical section**

- (1) Revisions in dimensions; and
- (2) Revisions in materials.

**(b) Plan and profile**

- (1) Plan
  - (a) Revisions to the alignment;
  - (b) Changes in the construction limits;
  - (c) Revisions in location, type, and grade of road approaches;
  - (d) Location and type of utilities;

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- (e) Skew of culverts; and
- (f) Elevations for all aerial and underground crossings of utilities.

**(2) Profile**

- (a) Revisions to grades, elevations, and stationing of vertical points of intersection (VPI);
- (b) Equations; and
- (c) Culvert diameter, length, type, and stationing.

Provide one paper as-built set of working drawings for review. Furnish the as-built working drawings to the CO or ERRS before the final inspection.

Correct all details found during the final inspection that are not shown on the as-built drawings.

Scan the drawings to produce clear, colored images. Develop separate files for each plan section and create an index by bookmarking each sheet. Furnish the electronic version in PDF format on CD or DVD. Return one paper and one electronic set of corrected as-built drawings to the CO or ERRS within 5 working days of the final inspection.

**104.04 Coordination of Contract Documents.** The FAR, specifications, and plans are contract documents. A requirement in one document is binding as though occurring in all the contract documents. The contract documents are intended to be complementary and to describe and provide for a complete contract. In case of discrepancy, calculated and shown dimensions govern over scaled dimensions. The contract documents govern in the following order:

- (a) Federal Acquisition Regulations;
- (b) Contract Requirements; and
- (c) Plans.

**104.05 Load Restrictions.** Follow the requirements of FAR Clause 52.236-10 Operations and Storage Areas, paragraph (c).

Comply with all legal load restrictions when hauling material and equipment on public roads to and from the project. A special permit does not relieve the Contractor of liability for damage resulting from the moving of material or equipment.

Unless otherwise permitted, do not operate equipment or vehicles that exceed the legal load limits over new or existing structures, or pavements within the project except those pavements intended to be removed.

## **Section 105. — CONTROL OF MATERIAL**

**105.01 Source of Supply and Quality Requirements.** Follow the requirements of FAR Clause 52.236-5 Material and Workmanship.

Select sources and provide acceptable material. Notify the CO or ERRS of all proposed sources before delivery to the project to expedite material inspection and testing. Do not incorporate material requiring submittal into the work until approved.

Material may be approved at the source of supply before delivery to the project. Approval does not constitute acceptance. If an approved source does not continue to supply acceptable material during the life of the project, further use of that source may be denied.

### **105.02 Material Sources.**

The Contractor is responsible for located sources, including established commercial sources. Use sources that fulfill the contract quantity and quality requirements. Use sources that are established, have provided material to public and private entities on a regular basis over the last two years, have appropriate State and local permits, and do not require expansion outside their currently established and permitted area.

Provide laboratory test reports and available historical performance data indicating that acceptable material is available from the source. Do not use material from a source that is unacceptable to the Government. Dispose of unacceptable material and locate another source at no cost to the Government.

**105.03 Storing and Handling Material.** Store and handle material to preserve its quality and fitness for the work. Stored material approved before storage may again be inspected before use in the work. Locate stored material to facilitate prompt inspection.

Use portions of the right-of-way approved by the CO or ERRS for staging or storing of materials and for equipment parking.

Provide additional space as needed. Do not use private property for staging or storage without written permission of the owner or lessee. Furnish copies of all agreements. Comply with Subsection 105.02 with respect to any staging or storage areas. Restore all Government-provided storage sites to their original condition.

The Contractor is responsible for the security of all stored material.

## **Section 106. — ACCEPTANCE OF WORK**

**106.01 Conformity with Contract Requirements.** Follow the requirements of FAR Clause 52.246-12 Inspection of Construction.

References to standard test methods of AASHTO, ASTM, GSA, and other recognized standard authorities refer to the methods in effect on the date of solicitation for bids. Use the 30th edition of the AASHTO Standard Specifications for Transportation Materials and Methods of Sampling and Testing and Appendix B of the Federal Lands Highway Field Materials Manual, dated October 2008. Use the modified AASHTO procedures for sampling and testing contained in the WFLHD Supplements to Nationally Developed Standard Test Procedures; except, when a specified sampling or test method is not included in this supplement, sample and test according to the referenced AASHTO test procedure. Appendix B of the Federal Lands Highway Field Materials Manual contains sampling and testing methods which may be required for this project that are not found in AASHTO.

Perform work according to the contract requirements. Perform all work to the lines, grades, cross-sections, dimensions, and processes or material requirements shown on the plans or specified in the contract.

Incorporate manufactured materials into the work according to the manufacturer's recommendations or to these specifications, whichever is stricter.

Plan dimensions and contract specification values are the values to be strived for and complied with as the design values from which any deviations are allowed. Perform work and provide material that is uniform in character and reasonably close to the prescribed value or within the specified tolerance range. The purpose of a tolerance range is to accommodate occasional minor variations from the median zone that are unavoidable for practical reasons.

The Government may inspect, sample, or test all work at any time before final acceptance of the project. When the Government tests work, copies of test reports are furnished to the Contractor upon request. Government tests may or may not be performed at the work site. If Contractor testing and inspection is verified by the Government, the Contractor's results may be used by the Government to evaluate work for acceptance. Do not rely on the availability of Government test results for process control.

Acceptable work conforming to the contract will be paid for at the contract unit bid price. Four methods of determining conformity and accepting work are described in Subsections 106.02 to 106.05 inclusive. The primary method of acceptance is specified in each Section of work. However, work may be rejected at any time it is found by any of the methods not to comply with the contract.

Remove, repair, or replace work that does not conform to the contract, or to prevailing industry standards where no specific contract requirements are noted. Removing, repairing, or replacing work; providing temporary traffic control; and any other related work to accomplish conformity will be at no cost to the Government.

As an alternative to removal and replacement, the Contractor may submit a written request to:

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- (a) Have the work accepted at a reduced price; or
- (b) Be given permission to perform corrective measures to bring the work into conformity.

The request must contain supporting rationale and documentation. Include references or data justifying the proposal based on an evaluation of test results, effect on service life, value of material or work, quality, aesthetics, and other tangible engineering basis. The CO or ERRS will determine disposition of the nonconforming work.

When standard manufactured items are specified (such as fence, wire, plates, rolled shapes, pipe conduits, etc., that are identified by gauge, unit mass, section dimensions, etc.), the identification will be considered to be nominal masses or dimensions. Unless specific contract tolerances are noted, established manufacturing tolerances will be accepted.

All specification limits, tolerances, test results, and related calculations are according to ASTM E 29, Absolute Method.

Obtain copies of the following documents by going to the webpage at:

<http://www.wfl.fhwa.dot.gov/resources/construction/cmr/fmm-extras.htm>

- Appendix B of the Federal Lands Highway Field Materials Manual, dated October 2008;
- WFLHD Supplements to Nationally Developed Standard Test Procedures;
- Standard WFLHD Method of Test for Accelerated Weathering of Aggregate by Use of Dimethyl Sulfoxide (DMSO); and

Obtain copies of the following documents by going to the webpage at:

<http://www.wfl.fhwa.dot.gov/resources/construction/field-notes>

- WFLHD Field Note Samples, dated April 2004.

**106.02 Visual Inspection.** Acceptance is based on visual inspection of the work for compliance with the specific contract requirements. In the absence of specific contract requirements or tolerances, prevailing industry standards may be used.

**106.03 Certification.** For material manufactured off-site, use a manufacturer with an ISO 9000 certification or an effective testing and inspection system. Require the manufacturer to clearly mark the material or packaging with a unique product identification or specification standard to which it is produced.

Other than references in or to the FAR or Federal Law, when these Standard Specifications reference certifications; certificates; or certified documents, equipment, or individuals, these references are not certifications under Section 4301 of Public Law 104-106, National Defense Authorization Act for Fiscal Year 1996. These references refer to documentation of non-regulatory, peripheral contract requirements that are required to be validated by an individual or organization having unique knowledge or qualifications to perform such validation.

Maintain records of all required certifications according to Subsections 103.02, 153.04, and 154.04. Submit certifications to the CO or ERRS.

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Check certifications, before incorporating the materials into the work, to ensure that the requirements of the contract have been met. Mark the certifications with the following information: project name, project number, contract item number, item description, Contractor's signature, and date.

Material accepted by certification may be sampled and tested at any time. If found not in conformance with the contract, the material will be rejected whether in place or not.

One of the following certifications may be required:

**(a) Production certification.** Material requiring a production certification is identified in the Acceptance Subsection of each Section. Require the manufacturer to furnish a production certification for each shipment of material. Include the following with each production certification:

(1) Date and place of manufacture;

(2) Lot number or other means of cross-referencing to the manufacturer's inspection and testing system; and

(3) Substantiating evidence that the material conforms to the contract quality requirements as required by FAR 46.105(a)(4), including all of the following:

(a) Test results on material from the same lot and documentation of the inspection and testing system;

(b) A statement from the manufacturer that the material complies with all contract requirements; and

(c) Manufacturer's signature or other means of demonstrating accountability for the certification.

**(b) Commercial certification.** When a certification is required, but not a production certification, furnish one commercial certification for all similar material from the same manufacturer.

A commercial certification is a manufacturer's or Contractor's representation that the material complies with all contract requirements. The representation may be labels, catalog data, stamped specification standards, or supplier's certifications indicating the material is produced to a commercial standard or specification.

**106.04 Measured or Tested Conformance.** Provide all necessary production and processing of the work and control performance of the work so that all of the work complies with the contract requirements.

Results from inspection or testing shall have values within the specified tolerances or specification limits. When no tolerance values are identified in the contract, the work will be accepted based on customary manufacturing and construction tolerances.

**106.05 Inspection at the Plant.** Work may be inspected at the point of production or fabrication. Manufacturing plants may be inspected for compliance with specified manufacturing methods. Material samples may be obtained for laboratory testing for compliance with quality requirements. Allow full entry at all times to the parts of the plant producing the work.

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**106.06 Partial and Final Acceptance.** Maintain the work during construction and until the project is accepted. Damage caused by the Contractor prior to final acceptance of the entire project will be repaired at the Contractor's expense. See FAR Clause 52.236-11 Use and Possession Prior to Completion.

**(a) Partial acceptance.** When a separate portion of the project is completed, a final inspection of that portion may be requested. If the portion is complete and in compliance with the contract, it may be accepted. If accepted, the CO or ERRS will relieve the Contractor of further responsibility for maintenance of the completed portion. Partial acceptance does not void or alter any of the terms of the contract.

When public traffic is accommodated through construction and begins using sections of roadway as they are completed, continue maintenance of such sections until final acceptance.

**(b) Final acceptance.** When notified that the entire project is complete, an inspection will be scheduled. If all work is determined to be complete, the inspection will constitute the final inspection and the Contractor will be notified in writing of final acceptance as of the date of the final inspection. Final acceptance relieves the Contractor of further responsibility for the maintenance of the project.

If the inspection discloses any unsatisfactory work, the CO or ERRS will provide to the Contractor a list of the work that is incomplete or requires correction. Immediately complete or correct the work. Furnish notification when the work has been completed as provided above.

## **Section 107. — LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC**

**107.01 Laws to be Observed.** Follow the requirements of FAR Clause 52.236-7 Permits and Responsibilities.

Comply with all applicable laws, ordinances, safety codes, regulations, orders, and decrees. Protect and indemnify the Government and its representatives against any claim or liability arising from or based on the alleged violation of the same.

Notify the CO or ERRS immediately of any permits or agreements that are required by the Contractor's methods of operation. Furnish copies of all acquired permits and agreements.

**107.02 Protection and Restoration of Property and Landscape.** Follow the requirements of FAR Clause 52.236-9 Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements.

Preserve public and private property, and protect monuments established for the purpose of perpetuating horizontal, vertical, cadastral, or boundary control. When necessary to destroy a monument, reestablish the monument according to applicable state statute or by the direction of the agency or individual who established the monument.

Do not disturb any area outside the construction. Replace trees, shrubs, or vegetated areas outside the construction limits damaged by construction operations as directed and at no cost to the Government. Only remove damaged limbs of existing trees when directed by an approved arborist.

Do not excavate, remove, damage, alter, or deface any archeological or paleontological remains or specimens. Control the actions of employees and subcontractors on the project to ensure that protected sites are not disturbed or damaged. Should any of these items be encountered, suspend operations at the discovery site, notify the CO or ERRS, and continue operations in other areas. The CO or ERRS will inform the Contractor when operations may resume at the discovery site.

When utilities are to be relocated or adjusted, the Government will notify all utility owners affected by the relocations or adjustments. The relocations or adjustments will be performed by others or will be included in the contract work.

Before beginning work in an area, the Contractor shall have all utility owners locate their utilities. Protect utilities from construction operations. Cooperate with utility owners to expedite the relocation or adjustment of their utilities to minimize interruption of service and duplication of work.

If utility services are interrupted as a result of damage by the construction, immediately notify the utility owner, the CO or ERRS, and other proper authorities. Cooperate with them until service is restored. Do not work around fire hydrants until provisions for continued service are made and approved by the local fire authority.

If utility adjustment work, not included in the contract, is required, compensation for the work will be provided under applicable clauses of the contract. Satisfactorily repair damage due to the fault or negligence of the Contractor at no cost to the Government.

Repair of damage to underground utilities that were not shown on the plans or identified before construction, and not caused by the fault or negligence of the Contractor, will be paid for by the Government.

**107.04 Responsibility for Damage Claims.** Indemnify and hold harmless the Government, its employees, and its consultants from suits; actions; or claims brought for injuries or damage received or sustained by any person, persons, or property resulting from the construction operations or arising out of the negligent performance of the contract.

Procure and maintain until final acceptance of the contract, liability insurance of the types and limits specified below. Obtain insurance from companies authorized to do business in the appropriate state. The insurance shall cover all operations under the contract whether performed by the Contractor or by subcontractors.

Before work begins, furnish "*certificates of insurance*" certifying that the policies will not be changed or canceled until 30 days written notice has been given to the Government. Insurance coverage in the minimum amounts set forth below shall not relieve the Contractor of liability in excess of the coverage.

Carry insurance meeting the following minimums:

- (a) Worker's compensation insurance. Minimum required by law.
- (b) Comprehensive or commercial general liability insurance.
  - (1) Personal injury and property damage coverage;
  - (2) Contractual liability coverage;
  - (3) Completed operations liability coverage;
  - (4) \$1,000,000 combined single limit for each occurrence; and
  - (5) \$2,000,000 general aggregate limit.
- (c) Automobile liability insurance. \$1,000,000 combined single limit for each occurrence.

**107.05 Contractor's Responsibility for Work.** Assume responsibility for all work until final acceptance except as provided in Subsection 106.07. This includes periods of suspended work. Protect the work against injury, loss, or damage from all causes whether arising from the execution or nonexecution of the work.

The Government will only be responsible for losses, injuries, and damages to work put in place that was caused by declared enemies and terrorists of the Government and cataclysmic natural phenomenon such as tornadoes, earthquakes, major floods, and other officially declared natural disasters. The Government will only be responsible for costs attributable to repairing or replacing damaged work. The Government will not be responsible for delay costs, impact costs, or extended overhead costs.



**107.06 Sanitation, Health, and Safety.** Follow the requirements of FAR Clause 52.236-13 Accident Prevention.

Submit an accident prevention plan for implementing safety and health standards at the Preconstruction Conference. Use the Government furnished Form WFLHD-28, *Guide Outline of Contractor's Accident Prevention Plan*.

Observe rules and regulations of Federal, State, and local health officials. Do not permit any worker to work in surroundings or under conditions that are unsanitary, hazardous, or dangerous.

Admit any OSHA inspector or other legally responsible official involved in safety and health administration to the project work site upon presentation of proper credentials.

Report accidents on forms furnished by the Government or, with prior approval, on forms used to report accidents to other agencies or insurance carriers. Maintain a *"Log of Work Related Injuries and Illnesses,"* OSHA Form 300, and make it available for inspection.

Install a reverse signal alarm audible above the surrounding noise level on all motorized vehicles having an obstructed view and on all earth-moving and compaction equipment.

**107.07 Legal Relationship of the Parties.** In the performance of the contract, the Contractor is an independent contractor and neither the Contractor nor anyone used or employed by the Contractor shall be an agent, employee, servant, or representative of the Government. The Contractor's independent contractor status does not limit the Government's general rights under the contract.

**107.08 Environmental Protection.** Conform to the following:

**(a) The Federal Water Pollution Control Act (33 USC § 1251 et seq.).**

(1) Except as authorized by this contract, do not operate mechanized equipment, discharge or place material within the boundaries of any U.S. waters as identified by the ordinary high water mark, high tide line, or edge of the wetland. This includes wetlands, unless authorized by a permit issued by the U.S. Army Corps of Engineers according to 33 USC § 1344, and if required by the state agency having jurisdiction over the discharge of material into the waters of the U.S. In the event of an unauthorized discharge:

- (a) immediately prevent further contamination;
- (b) immediately notify appropriate authorities and the CO or ERRS; and
- (c) mitigate damages as required.

(2) Separate work areas, including material sources by the use of a suitable barrier that prevents sediment, petroleum products, chemicals, other liquids, or solid materials from entering the waters of the U.S. Construct and remove barriers to avoid discharge of material into the waters of the U.S. Remove and properly dispose of sediment or other material collected by the barrier.

**(b) Oil and Hazardous Substances.** A Spill Prevention, Control, and Countermeasure (SPCC) plan will be required to be submitted for sites that meet regulatory requirements.

Submit and follow a Hazardous Spill Plan when an SPCC plan is not in effect. Submit the plan at least 2 days before beginning work. Develop a plan describing what actions will be taken in case of a spill and incorporate preventative measures to be implemented (such as the placement of refueling facilities, storage and handling of hazardous materials, etc).

Do not use equipment that is leaking fluids. Repair leaks on equipment immediately. Keep a supply of absorbent materials at the job site in the event of spills. Acceptable absorbent materials are those manufactured specifically for the containment and clean up of hazardous materials.

Immediately notify the CO or ERRS of all hazardous spills.

**107.09 Protection of Forests, Parks, and Public Lands.** Comply with all regulations of the State fire marshal, conservation commission, Forest Service, National Park Service, Bureau of Land Management, Fish & Wildlife Service, Bureau of Indian Affairs, or other authority having jurisdiction governing the protection of land including or adjacent to the project.

## **Section 108. — PROSECUTION AND PROGRESS**

**108.01 Commencement, Prosecution, and Completion of Work.** Follow the requirements of FAR Clause 52.211-10 Commencement, Prosecution, and Completion of Work.

A preconstruction conference will be held after the contract is awarded and before beginning work. Seven days before the preconstruction conference, furnish three copies of the preliminary construction schedule.

Furnish at least 48 hours advance notice before changing the current work schedule.

Mobilize all necessary personnel, equipment, material, and incidentals to the project site and commence construction operations within 7 days of receiving the notice to mobilize by the CO or ERRS according to Section 151.

### **108.01A Labor.** (Added Subsection.)

Follow the requirements of FAR Clause 52.222-6 Davis Bacon Act.

Adjacent or virtually adjacent work sites are defined to be work sites within ½ mile of the project. Application of the Davis-Bacon Act for work sites beyond ½ mile of the project will be determined by the CO or ERRS.

**108.02 Subcontracting.** Subcontracting does not relieve the Contractor of liability and responsibility under the contract and does not create any contractual relation between subcontractors and the Government. The Contractor is liable and responsible for any action or lack of action of subcontractors.

**108.03 Stop Order.** The CO or ERRS may order the performance of the work to be stopped, either in whole or in part, for such periods deemed necessary due to the following:

- (a) Weather or soil conditions considered unsuitable for prosecution of the work; or
- (b) Failure of the Contractor to:
  - (1) Correct conditions unsafe for the workers or the general public;
  - (2) Carry out written orders given by the CO or ERRS; or
  - (3) Perform any provision of the contract.

No adjustment in contract time or amount will be made for stop orders issued under (a) or (b) above except an adjustment in contract time, as provided by FAR Clause 52.249-10 Default (Fixed-Price Construction), may be made when the Contractor is able to demonstrate that the weather was unusually severe based on the most recent 10 years of historical data.

## **Section 109. — MEASUREMENT AND PAYMENT**

**109.01 Measurement of Work.** Take and record measurements and perform calculations to determine quantities for work performed. Take or convert all measurements of work according to United States customary measure.

Unless otherwise specified, measure when the work is in place, complete, and accepted. Measure the actual work performed, except do not measure work outside the design limits or other adjusted or specified limits (staked limits). Measure structures to the lines shown on the plans or to approved lines adjusted to fit field conditions.

Take measurements as described in Subsection 109.02.

Remeasure quantities if it has been determined that any portion of the work is acceptable but has not been completed to the lines, grades, and dimensions shown on the plans or established by the CO or ERRS.

Submit measurement notes to the CO or ERRS within 24 hours of completing the work. For on-going work, submit measurement notes weekly. When work is not complete, identify the measurement as being an interim measurement. Submit the final measurement when the installation is completed. Measurement notes form the basis of the Government's receiving report (see Subsection 109.08(d)). For lump sum items, submit documentation to support invoiced progress payment on a monthly basis.

Prepare pay item measurement notes on "Record of Miscellaneous Items" (Form FHWA 17348). For an electronic version of the form go to:

<http://www.wfl.fha.dot.gov/other/it/forms/17348.pdf>.

As a minimum, include the following information in all records of measurement:

- (a) Project name and number;
- (b) Contract item number;
- (c) Date the work was performed;
- (d) Location of the work;
- (e) Measured quantity;
- (f) Calculations made to arrive at the quantity;
- (g) Supporting sketch and details as needed to clearly define the work performed and the quantity measured;
- (h) Names of persons measuring the work;
- (i) Identification as to whether the measurement is interim or final; and

(j) Signed certification statement by the persons taking the measurements, performing the calculations, and submitting them for payment that the measurement and calculations are correct to the best of their knowledge and that the quantity being measured is subject to direct payment for the identified item under the contract.

**109.02 Measurement Terms and Definitions.** Unless otherwise specified, the following terms are defined as follows:

**(a) Cubic yard.**

**(1) Cubic yard in place.** Measure solid volumes by a method approved by the CO or ERRS or by the average end area method as follows:

(a) Take cross-sections of the original ground and use with design or staked templates or take other comparable measurements to determine the end areas. Do not measure work outside of the established lines or slopes.

(b) If any portion of the work is acceptable but is not completed to the established lines and slopes, retake cross-sections or comparable measurements of that portion of the work. Deduct any quantity outside the designated or staked limits. Use these measurements to calculate new end areas.

(c) Compute the quantity using the average end areas multiplied by the horizontal distance along a centerline or reference line between the end areas. Deduct any quantity outside the designed or staked limits.

**(2) Cubic yard in the hauling vehicle.** Measure the cubic yard volume in the hauling vehicle using three-dimensional measurements at the point of delivery. Use vehicles bearing a legible identification mark with the body shaped so the actual contents may be readily and accurately determined. Before use, mutually agree in writing on the volume of material to be hauled by each vehicle. Vehicles carrying less than the agreed volume may be rejected or accepted at the reduced volume.

Level selected loads. If leveling reveals the vehicle was hauling less than the approved volume, reduce the quantity of all material received since the last leveled load by the same ratio as the current leveled load volume is to the agreed volume. Payment will not be made for material in excess of the agreed volume.

Material measured in the hauling vehicle may be weighed and converted to cubic yards for payment purposes if the conversion factors are mutually agreed to in writing.

**(b) Each.** One entire unit. The quantity is the actual number of units completed and accepted.

**(c) Day.** One entire unit. The quantity is the actual number of whole calendar days.

**(d) Gallon.** The quantity may be measured by any of the following methods:

**(1)** Measured volume container.

**(2)** Metered volume. Use an approved metering system.

**(3)** Commercially-packaged volumes.

When asphalt material is measured by the gallon, measure the volume at 60 °F or correct the volume to 60 °F using recognized standard correction factors.

**(e) Hour.** Measure the actual number of hours ordered by the CO or ERRS and performed by the Contractor.

**(f) Linear foot.** As applicable, measure the work along its length from end-to-end; parallel to the base or foundation; along the top; along the front face; or along the invert. Do not measure overlaps.

**(g) Lump sum.** Do not measure directly. The bid amount is complete payment for all work described in the contract and necessary to complete the work for that item. The quantity is designated as "All." Estimated quantities of lump sum work shown in the contract are approximate.

**(h) Mile.** 5,280 linear feet. Measure horizontally along the centerline of each roadway, approach road, or ramp.

**(i) Pound.** Measure according to Subsection 109.03. If sacked or packaged material is furnished, the net weight as packed by the manufacturer may be used.

**(j) Square foot.** Measure on a plane parallel to the surface being measured.

**(k) Square yard.** 9 square feet. Longitudinal and transverse measurements for area computations will be made horizontally. No deductions from the area computation will be made for individual fixtures having area of 9 square feet or less. Do not measure overlaps.

**(l) Station.** 100 linear feet. Measure horizontally along centerline or reference line of each roadway, approach road, or ramp.

**(o) Ton.** 2,000 pounds avoirdupois. Measure according to Subsection 109.03.

No adjustment in a contract unit price will be made for variations in quantity due to differences in the specific gravity or moisture content.

Use net-certified scale masses, or masses based on certified volumes in the case of rail shipments as a basis of measurement subject to correction when asphalt material is lost from the car or the distributor, wasted, or otherwise not incorporated in the work. When asphalt material is shipped by truck or transport, net-certified masses, subject to correction for loss or foaming, may be used for computing quantities.

When emulsified asphalt is converted from volume to mass, use a factor of 240 gallons per ton regardless of temperature.

When asphalt binder for asphalt concrete pavement is stored in tanks devoted exclusively to the project, base quantities on invoices. When asphalt binder for asphalt concrete pavement is not stored in tanks devoted exclusively to the project, or when the validity of the quantity requested for payment is in question, base quantities on the asphalt content determined by testing.

**109.03 Weighing Procedures and Devices.** Batch masses may be acceptable for determination of pay quantities when an approved automatic weighing, cycling, and monitoring system is included as part of the batching equipment.

When a weighing device is determined to indicate less than true mass, no additional payment will be made for material previously weighed and recorded. When a weighing device is determined to

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indicate more than true mass, all material received after the last previously correct weighing accuracy test will be reduced by the percentage of error in excess of 0.5 percent.

When material is proportioned or measured and paid for by mass, provide one of the following:

**(a) Commercial weighing system.** Use permanently-installed and certified commercial scales.

**(b) Invoices.** If bulk material is shipped by truck or rail and is not passed through a mixing plant, furnish a supplier's invoice with net mass or volume converted to mass. Periodic check weighing may be required.

**(c) Project weighing system.** Furnish, erect, and maintain acceptable automatic digital scales. For small quantities, manual scales may be used when approved in writing by the CO or ERRS and if the method of weighing meets all other contract requirements. Provide scales that record mass at least to the nearest 100 pounds. Maintain the scale accuracy to within 0.5% of the correct mass throughout the range of use.

Do not use spring balances.

Install and maintain platform scales with the platform level with rigid bulkheads at each end. Make the platform of sufficient length to permit simultaneous weighing of all axle loads of the hauling vehicle. Coupled vehicles may be weighed separately or together according to Section 2.20 paragraph UR 3.3 of *NIST Handbook 44*.

Install and maintain belt-conveyor scales according to Section 2.21 of *NIST Handbook 44*.

Before production on the project, after relocation, and at least once per year, have the weighing portion of the system checked and certified by the State Bureau of Weights and Measures or a private scale service certified by the Bureau of Weights and Measures. Seal the system to prevent tampering or other adjustment after certification.

Attach an automatic printer to the scale that is programmed or otherwise equipped to prevent manual override of all mass information. For weighed pay quantities, program the printer to provide the following information for each weighing:

- (1) Project number;
- (2) Item number and description;
- (3) Date;
- (4) Time;
- (5) Ticket number;
- (6) Haul unit number;
- (7) Net mass in load at least to the nearest 100 pounds;
- (8) Subtotal net mass for each haul unit since the beginning of the shift; and
- (9) Accumulated total net mass for all haul units since the beginning of the shift.

If a printer malfunctions or breaks down, the Contractor may manually weigh and record masses for up to 48 hours provided the method of weighing meets all other contract requirements.

Furnish competent scale operators to operate the system.

When platform scales are used, randomly weigh the empty haul units at least twice per shift.

Use an approved format for the mass records. Furnish the original record(s) and a written certification as to the accuracy of the masses at the end of each shift.

**109.04 Receiving Procedures.** When the method of measurement requires weighing or volume measurement in the hauling vehicle, furnish a person to direct the spreading and distribution of material and to record the location and placement of the material on the project. During the placement, maintain a record of each delivery and document it in an acceptable manner. Include the following information as applicable:

- (a) Project identification;
- (b) Contract pay item number and description;
- (c) Location where placed;
- (d) Date;
- (e) Load number;
- (f) Truck identification;
- (g) Time of arrival;
- (h) Mass or volume; and
- (i) Spread person's signature.

Use an approved format for the delivery record(s). Furnish the original record(s) and a written certification of the delivery of the material at the end of each shift.



## **Section 151. — MOBILIZATION**

### **Description**

**151.01** This work consists of moving personnel, equipment, material, and incidentals to the project and performing all work necessary before beginning work at the project site. Mobilization includes the obtaining of permits, insurance, and bonds.

**151.02 Standby.** Standby consists of being mobilized to the site and ready to commence construction operations.

### **Measurement**

**151.02** Measure mobilization according to Subsection 109.02.

Standby will be measured by the day. Standby will include days that the contractor is on site and unable to commence construction operations because the CO or ERRS orders the performance of the work to be stopped. Do not measure days within 7 days of notice to mobilize.

## Section 152. — CONSTRUCTION SURVEY AND STAKING

### Description

**152.01** This work consists of furnishing qualified personnel and necessary equipment and material to survey, stake, calculate, and record data for the control of work. See FAR Clause 52.236-17 Layout of Work.

Personnel, equipment, and material shall conform to the following:

- (a) Personnel.** Furnish technically qualified survey crews experienced in highway construction survey and staking. Provide personnel capable of performing in a timely and accurate manner. An acceptable crew supervisor shall be on the project whenever surveying/staking is in progress.
- (b) Equipment.** Furnish survey instruments and supporting equipment capable of achieving the specified tolerances.
- (c) Material.** Furnish acceptable tools, supplies, and stakes of the type and quality normally used in highway survey work and suitable for the intended use. Furnish stakes and hubs of sufficient length to provide a solid set in the ground with sufficient surface area above ground for necessary legible markings.

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#### 152.02 General.

- (a) Government set reference lines and points.** The Government has set horizontal and vertical control points for the project. The location and identity of each control point are shown on the plans.

Before beginning construction, notify the CO or ERRS of any missing control points or stakes. The Government will reestablish control points and stakes missing before the beginning of

- (b) Government furnished information.** The Government will furnish the following data relating to horizontal and vertical alignment and theoretical slope stake catch points, and other design data:

- (1)** Computer listings containing horizontal alignment, vertical profile, superelevation, excavation and embankment slope ratios, and earthwork quantities;
- (2)** Printed and digital (.CSV format) construction staking notes showing theoretical slope stake catch points;
- (3)** Printed clearing notes (based on theoretical catch points);
- (4)** X, Y, Z coordinates (horizontal and vertical control points);

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(5) Printed and digital (.CSV format) X, Y, Z coordinates (subgrade and base layers at centerline and shoulders); and

(6) Plotted cross sections (earthwork).

Perform additional conversions and calculations as necessary for convenient use of Government-furnished data. The Contractor is responsible for the accuracy of all staking information converted from the Government-furnished data. Provide immediate notification of apparent errors in the initial staking or in the furnished data.

**(c) Pre-survey meeting.** Before surveying or staking, discuss and coordinate the following with the CO or ERRS:

(1) Surveying and staking methods;

(2) Stake marking;

(3) Grade control for courses of material;

(4) Referencing;

(5) Structure control; and

(6) Any other procedures and controls necessary for the work.

Preserve all initial reference and control points. After beginning construction, replace all destroyed or disturbed initial reference or control points necessary to the work.

Prepare field notes in an approved format. Sample note formats are available as listed in Subsection 106.01. Furnish all survey notes at least weekly.

Survey and establish controls within the tolerances shown in Table 152-1. The construction survey and staking work may be spot-checked for accuracy, and unacceptable portions of work may be rejected. Resurvey rejected work, and correct work that is not within the tolerances specified in Table 152-1. Acceptance of the construction staking does not relieve the Contractor of responsibility for correcting errors discovered during the work and for bearing all additional costs associated with the error.

Start work only after staking for the affected work is accepted.

Compute and furnish calculations supporting pay quantities. Measure quantities within the tolerances shown in Table 152-2.

All field notes, pay notes, and supporting documentation become the property of the Government upon completion of the work.

Remove and dispose of all flagging, lath, stakes, and other staking material after the project is complete. Remove visible portions of brushes if used to mark grade finishing stakes.

**152.03 Survey and Staking Requirements.** Perform all survey, staking, recording of data, and calculations as necessary to construct the project from the initial layout to final completion. Reset stakes as many times as necessary to construct the work.

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**(a) Control points.** Relocate initial horizontal and vertical control points in conflict with construction to areas that will not be disturbed by construction operations. Furnish the coordinates and elevations for the relocated points before the initial points are disturbed.

**(b) Roadway cross-sections.** Take roadway cross-sections normal to centerline. When the centerline curve radius is less than or equal to 500 feet, take cross-sections at a maximum centerline spacing of 25 feet. When the centerline curve radius is greater than 500 feet, take cross-sections at a maximum centerline spacing of 50 feet. Take additional cross-sections at significant breaks in topography and at changes in the typical section. Along each cross-section, measure and record points at breaks in topography, but no further apart than 20 feet. Measure and record points to at least the anticipated slope stake and reference locations. Reduce all cross-section distances to horizontal distances from centerline.

**(c) Slope stakes and references.** Set slope stakes and references on both sides of centerline at the cross-section locations. Establish slope stakes in the field as the actual point of intersection of the design roadway slope with the natural ground line. Set slope stake references outside the clearing limits. Include all reference point and slope stake information on the reference stakes. When initial references are provided, slope stakes may be set from these points with verification of the slope stake location with field measurements. Recatch slope stakes on any section that does not match the staking report within the tolerances established in Table 152-1. Take roadway cross-section data between centerline and the new slope stake location. Set additional references even when initial references are provided.

**(d) Centerline reestablishment.** Reestablish centerline from instrument control points. The maximum spacing between centerline points is 25 feet when the centerline curve radius is less than or equal to 500 feet. When the centerline curve radius is greater than 500 feet, the maximum distance between centerline points is 50 feet.

**(e) Grade finishing stakes.** Set grade finishing stakes, for grade elevations and horizontal alignment, on centerline and on each shoulder at roadway cross-section locations. Set stakes at the top of subgrade and the top of each aggregate course.

The maximum longitudinal spacing between stakes is 25 feet when the centerline curve radius is less than or equal to 500 feet. When the centerline curve radius is greater than 500 feet, the maximum longitudinal spacing between stakes is 50 feet. The maximum transverse spacing between stakes is 20 feet. Use brushes or guard stakes at each stake.

**(f) Culverts.** Stake culverts to fit field conditions. The location of culverts may differ from the plans. Perform the following:

- (1) Survey and record the ground profile along the culvert centerline.
- (2) Determine the slope catch points at the inlet and outlet.
- (3) Set reference points and record information necessary to determine culvert length and end treatments.
- (4) Plot-to-scale the profile along the culvert centerline. Show the natural ground, the flow line, the roadway section, and the culvert including end treatments and other appurtenances. Show elevations, grade, culvert length, and degree of elbow.

(5) Submit the plotted field-design cross-section for approval of final culvert length and alignment.

(6) When the field design has been approved, set drainage structure survey stakes, reference stakes, and stake inlet and outlet ditches to make the structure functional.

(7) Stake or grade ditches to make the culvert functional.

**(g) Miscellaneous survey and staking.** Perform all surveying, staking, and recording of data essential for establishing the layout and control of the following, as applicable:

(1) Utilities; and

(2) Pavement markings.

**Table 152-1**  
**Construction Survey and Staking Tolerances<sup>(1)</sup>**

Staking Phase	Horizontal	Vertical
Existing Government network control points	±0.06 feet	±0.035 feet $\times \sqrt{M}$ <sup>(2)</sup>
Local supplemental control points set from existing Government network points	±0.03 feet	±0.01 feet $\times \sqrt{N}$ <sup>(3)</sup>
Centerline points <sup>(4)</sup> — (PC), (PT), (POT), and (POC) including references	±0.03 feet	±0.03 feet
Other centerline points	±0.16 feet	±0.16 feet
Cross-section points and slope stakes <sup>(5)</sup>	±0.16 feet	±0.16 feet
Slope stake references <sup>(5)</sup>	±0.16 feet	±0.16 feet
Culverts, ditches, and minor drainage structures	±0.16 feet	±0.06 feet
Clearing and grubbing limits	±2.00 feet	—
Roadway subgrade finish stakes <sup>(7)</sup>	±0.16 feet	±0.03 feet
Roadway finish grade stakes <sup>(7)</sup>	±0.16 feet	±0.03 feet

(1) At 95% confidence level. Tolerances are relative to existing Government network control points.

(2) M is the distance in miles.

(3) N is the number of instrument setups.

(4) Centerline points: PC - point of curve, PT - point of tangent, POT - point on tangent, POC - point on curve.

(5) Take the cross-sections normal to the centerline ±1 degree.

(6) Bridge control is established as a local network and the tolerances are relative to that network.

(7) Includes paved ditches.

**Table 152-2  
Measurement Tolerances**

<b>Pay Unit</b>	<b>Horizontal</b>	<b>Vertical</b>
Acre	1.0 feet or 1:100 whichever is greater	—
Cubic Yard	0.2 foot or 1:500 whichever is greater	0.3 foot or 1:333 whichever is greater
Linear Foot	0.2 foot or 1:500 whichever is greater	—
Station	1.0 feet or 1:1000 whichever is greater	—

**152.04 Acceptance.** Construction survey and staking will be evaluated under Subsections 106.02 and 106.04.

### **Measurement**

**152.05** Measure the Section 152 items listed in the bid schedule according to Subsection 109.02 and the following as applicable.

Do not measure resetting stakes.

## **Section 153. — CONTRACTOR QUALITY CONTROL**

### **Description**

**153.01** This work consists of providing inspection, exercising management control, obtaining samples for Quality Control (QC) testing, and performing QC tests to ensure that all work conforms to the contract requirements. See FAR Clause 52.246-12 Inspection of Construction.

### **Construction Requirements**

**153.02 Personnel Qualifications.** Furnish a QC manager with at least one year of experience managing highway construction QC or quality assurance programs

**153.03 General.** Provide a QC system and personnel that plans, performs, and documents QC activities.

Alternative QC systems that meet the intent of this specification may be approved by contract modification if approved by the CO or ERRS.

Provide a QC manager or designated QC staff on-project during the execution of all work, except as authorized by the CO or ERRS with the authority to stop work not in compliance or cease work that will result in non-compliance with contract requirements.

Identify an alternate in the manager's absence. The alternate must meet the qualifications for a QC manager. An alternate may not act for the QC manager for a period greater than 3 days unless approved by the CO or ERRS.

Submit names and qualifications of the QC manager and any alternate to the CO or ERRS for approval 7 days before start of work.

Furnish additional QC staff (inspectors, testers, reviewers, and clerical assistants) to complete the work as specified in this Section. Provide names and qualifications of additional personnel to the CO or ERRS 7 days before start of work.

Superintendents, foremen, and traffic and safety supervisors can be designated as QC manager or other QC personnel.

Duties other than QC activities described under this section shall not be performed by Contractor QC staff except as authorized by the CO or ERRS.

Within 7 days after the preconstruction meeting a Contractor QC coordination meeting will be held to achieve mutual understanding of Contractor QC and review initial QC plans.

**153.04 Quality Control Plans.** Provide QC plans for selected work features. The absence of a plan for other items of work does not relieve the Contractor of complying with the contract

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requirements. QC plans and activities provided under this specification are minimum requirements. Other QC activities may be required to provide effective quality management.

**(a) Development.** Develop QC plans for the following work features:

- Excavation and Embankment, sloping and shaping (Section 204);
- Excavation and Embankment, finishing subgrade (Section 204);
- Aggregate Courses (Sections 308);
- Asphalt Pavement (Sections 404);
- Drainage Structures (Sections 602); and

Use “*Contractor Quality Control Plan*” (Form WFLHD 471) to prepare the QC plan for each work feature. For an electronic version of the form go to

<http://www.wfl.fhwa.dot.gov/resources/construction/forms/>.

Complete the first three columns of form WFLHD 471 and submit to the CO or ERRS for acceptance at least 7 days before commencing work. Address the following activities on the worksheet:

- (1) Review contract requirements, plans and specifications independently and with construction supervisory staff;
- (2) Check and verify submittals, plans, and materials certifications meet contract requirements and submit to CO or ERRS for approval. Provide statement and signature of verification according to Subsection 106.03;
- (3) Check site conditions for constructability, including staging, disposal and storage areas. Verify materials delivered to the site conform to accepted materials certifications, submittals, plans and contract requirements before incorporating into the project.
- (4) Review construction staking to assure it meets contract requirements, accuracy and sufficiency for each work feature;
- (5) Provide an operational work plan. Include a brief written narrative of the work activity for the feature describing methods, locations, crews, equipment and methods to be used to complete the work;
- (6) Conduct pre-work meetings. Review contract requirements with construction crew, foremen, and Government personnel before beginning work. Provide an overview of the operational work plan;
- (7) Ensure construction methods and test procedures are followed that will result in the end product meeting the contract requirements. Verify by including as a minimum the:
  - QC sampling and testing requirements in Table 153-1;
  - QC inspection and measurement requirements in Table 153-2;



- QC inspection of start-up work activities; and
- sampling and testing requirements at the end of each specific Section.

Perform corrective actions to QC activities as needed to ensure work meets contract requirements.

**(8)** Conduct weekly QC coordination meetings with the CO or ERRS to develop and maintain mutual understanding of completed and upcoming QC activities. Provide immediate on-site presence to communicate status of work to FHWA personnel and Contractor personnel and for QC issue resolution;

**(9)** Verify completed work meets contract requirements.

Revise QC plans when personnel, activities, or processes change or when deficiencies occur in the work.

The CO or ERRS may request additional QC plans for work features not listed above if work in progress or completed work is in nonconformance with contract requirements or is lacking an effective QC process.

**(b) Implementation.** Implement QC activities as described in the accepted plan. Do not begin a work feature until the plan is approved by the CO or ERRS and a prework meeting is performed.

**(1) QC Reports** - Report QC meetings, reviews, inspections, measurements, testing activities, corrective actions, and discussions that verify work meets requirements as QC activities listed in “*Contractor Quality Control Plan*” (Form WFLHD 471) are completed. Provide narrative and original support data. Document findings such as deficiencies found in the work and describe corrective actions, adjustments to frequency of QC activities, and method or process changes to correct and eliminate future deficiencies. Provide reports daily to the CO or ERRS or as specified in the QC plan. Include the following certification:

*"I certify that the information contained in this record is accurate, and that all work documented herein complies with the requirements of the contract. Any exceptions to this certification are documented as a part of this record."*

For an electronic version of the form go to:

<http://www.wfl.fhwa.dot.gov/resources/construction/forms/>.

**(2) Notification of Completion of Work** - Submit a completed “*Notification of Completion of Work*” (Form WFLHD 470) when work listed in Subsection 153.06 and other work as directed by the CO or ERRS is ready for Government quality assurance inspection.

**153.05 Quality Control Sampling and Testing.** Provide sampling and testing as listed in Table 153-1.

Testing of trial samples may be required to demonstrate testing competence.

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Sample and split samples according to AASHTO or other acceptable procedures. Allow the CO or ERRS the opportunity to witness all sampling. Immediately perform splits when required. Deliver the Government's portion of the sample or split sample in an acceptable container suitable for shipment. Label all samples with the following information:

- Project number;
- Source of material;
- Pay item number;
- Sample number;
- Date sampled;
- Time sampled;
- Location sample taken;
- Name of person sampling;
- Name of person witnessing sampling; and
- Type of test required on sample.

Provide the following documentation:

**(a) Quality Control Test Results.** Report test results on forms containing all sample information required by Subsection 153.05. Attach worksheets used to determine test values to the test result forms when submitted.

**(b) Control Charts.** Maintain linear control charts that identify the project number, contract item number, test number, each test parameter, the upper and/or lower specification limit applicable to each test parameter, and test results. Use the control charts to document the variability of the process, identify production and equipment problems, and identify potential pay factor adjustments. Make corrections to the process when problems are evident. Post charts at the Contractor's project testing lab and on site.

**153.06 Government Quality Assurance Inspection.** Submit a "*Notification of Completion of Work*" (Form WFLHD 470) when the following work is ready for inspection:

**(a)** Allow 1 working day for the following work to be inspected.

**(1)** Survey and staking (field stakes and notes). Provide survey notes for the following:

- (a) Control points – before disturbing original control points; and
- (b) Slope stakes – before starting embankment.

**(2)** Construction work.

- (a) Subgrade – before placing pavement structure; and
- (b) Any layer of pavement structure requiring hubs – before placing next layer.

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**(b) Reserved.**

**153.07 Acceptance.** Contractor QC will be evaluated under Subsections 106.02 and 106.04 based on the demonstrated ability of Contractor's QC system to ensure work meets the contract requirements.

If the Government's testing and inspection (quality assurance) indicate that the Contractor's QC system is ineffective or the plans are not being followed; make immediate improvements to correct inadequacies. Furnish notification in writing of improvements and modifications to the system.

A maximum of 10 percent of the total progress payment amount will be retained and affected project work may be stopped if a QC plan is not accepted, the plan is not being followed, or work does not meet contract requirements.

**Table 153-1**  
**Quality Control Sampling and Testing Requirements**

Material or Product	Characteristic	Test Method or Specification	Sampling Frequency	Point of Sampling	Split Sample	Reporting Time
<b>Sections 404 Minor Hot Asphalt Concrete</b>						
Asphalt mixture	Compaction (Roadway paving)	ASTM D 2950	1 every 1000 feet each lift	In place	No	End of shift

Table 153-2 Quality Control Inspection and Measurement Requirements						
Activity	Characteristic	Specification or Activity	Tolerance and Reference	Measurement or Inspection Frequency	Point of Inspection or Measurement	Reporting Time
Section 152 Construction Survey and Staking						
Construction staking	Construction staking	Measurements to check accuracy and adequacy of construction staking	Subsection 152.03 and Table 152-1	15% of staked, lines points or marks. and 100% of staked or surveyed points, marks or lines on bridges, walls or other major structures	Completed staking	End of shift
Section 204 Roadway Excavation						
Preparing foundation for embankment construction	Less than 4 feet above natural ground. Scarification of existing asphalt, concrete or gravel. Across ground not capable of supporting equipment. Existing slopes steeper than 1:3, embankment benching	Visual inspection	Subsection 204.04	Daily	Preparatory Grading Operation	24 hrs
Embankment construction	General, Embankment within roadway prism, Individual rock fragments and boulders, Outside roadway prism, other embankments	"	Subsection 204.05	"	"	"
Sloping, Shaping and finishing	Sloping, stepped slopes, shaping, finishing	"	Subsection 204.07	"	"	"
Section 209 Structure Excavation and Backfill						
General structure excavation	Excavation, OSHA, conserving stockpiling and disposing	Visual inspection	Subsection 209.03	Daily	Structural excavation	24 hrs
Foundation preparation	Unsuitable material	"	Subsection 209.04	"	"	"
Bedding	For pipe culverts	"	Subsection 209.05	"	"	"
Backfill	Pipe culverts	"	Subsection 209.06	"	"	"
Section 308 Minor Crushed Aggregate						
Preparing surface	Roadway aggregate	Visual inspection and verification measurement	Subsection 308.03	Daily	Roadway	24 hrs
Placing	Roadway aggregate	"	Subsection 308.04	"	"	"
Compacting and finishing	Roadway aggregate	"	Subsection 308.05	Daily and Minimum of one finish tolerance verification measurement every 200 feet horizontal	"	4 hrs

Section 404 Minor Hot asphalt Concrete						
Surface Preparation		Visual inspection	Subsection 404.03	Daily before paving	Roadway	End of shift
Weather limitations		"	Subsection 404.04	Daily	"	"
Hauling		"	Subsection 404.05	"	"	"
Placing		"	Subsection 404.07	"	"	"
Compacting	Roadway paving, and non roadway paving	Visual inspection, and see Section 404 under Table 153-1 for testing requirements	Subsection 404.08			
Pavement Smoothness	Straightedge	Measurement	Subsection 404.09	One pavement smoothness tolerance verification measurement every 200 feet horizontal	Roadway	End of shift
Section 412 Asphalt Tack Coat						
Asphalt tack coat surface preparation	Finishing road surfaces for asphalt application	Visual inspection	Subsection 412.04	Daily	Installation	End of shift
Weather limitations	Temperature and moisture requirements	"	Subsection 412.05	"	"	"
Asphalt application	Application methods, rates, excess tack, curing	"	Subsection 412.06	"	"	"
Section 602 Culverts and Drains						
General	Contiguous materials, location, length, Section 209, excavation, backfill	Visual inspection and verification measurements of culvert staking and lift thickness See Section 209 and 152 See Table 153-2 for quality control testing	Subsection 602.03	Daily	Installation	24 hrs
Laying metal pipe	Metal lap joint location, coupling bands	"	Subsection 602.04	"	"	"
Section 634 Permanent Pavement Markings						
General	Location of markings, surface condition, manufacturers recommendation, packaging, shipping,	Visual inspection	Subsection 634.03	As required	Installation	24 hrs
Traffic paint	Type A, surface conditions, temperature, application rates, glass bead application rate, number of coats	Visual inspection and verification measurement and documentation of application rates	"	"	"	"

## Section 154. — CONTRACTOR SAMPLING AND TESTING

### Description

**154.01** This work consists of obtaining samples for testing. When there is a contract pay item for Contractor testing included in the bid schedule, it also consists of testing and reporting required test results. It does not include Contractor quality control testing required under Section 153. However, include the work required under this Section in the Section 153 quality control plan.

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**154.02 Sampling.** Sample material to be tested according to the Sampling and Testing Requirements tables included at the end of each section. The sampling schedules and times will be provided by the CO or ERRS using a random number system. In addition, sample any material that appears defective or inconsistent with similar material being produced unless such material is voluntarily removed and replaced or corrected.

Sample and split samples according to AASHTO or other acceptable procedures. Allow the CO or ERRS the opportunity to witness all sampling. Immediately perform splits when required. Deliver the Government's portion of the sample or split sample in an acceptable container suitable for shipment. Label all samples with the following information:

- (a) Project number;
- (b) Source of material;
- (c) Pay item number;
- (d) Sample number;
- (e) Date sampled;
- (f) Time sampled;
- (g) Location sample taken;
- (h) Name of person sampling;
- (i) Name of person witnessing sampling; and
- (j) Type of test required on sample.

**154.03 Testing.** When there is a contract pay item for Contractor testing included in the bid schedule, perform all tests required by the Sampling and Testing Requirements tables at the end of each section. Allow the CO or ERRS the opportunity to witness all testing. Testing of trial samples may be required to demonstrate testing competence.

**154.04 Records.** Report test results on forms containing all sample information required by Subsection 154.02. Label clearly all interim measurements used to determine the results. Attach

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work sheets used to determine test values to the test result forms when submitted. When tests are on material being incorporated in the work, report test results within 24 hours except as specified in the Sampling and Testing Requirements tables. Payment for work may be delayed or the work suspended until test results are provided.

**154.05 Acceptance.** Contractor sampling and testing will be evaluated under Subsections 106.02 and 106.04 based on Government verification testing.

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## Section 204. — EXCAVATION AND EMBANKMENT

### Description

**204.01** This work consists of constructing embankments. This includes furnishing, hauling, stockpiling, placing, sloping, shaping, compacting, and finishing earthen and rocky material.

**204.02 Embankment construction.** Embankment construction consists of placing and compacting borrow excavation. Construct the top 12 inches of the embankment with topping.

This work includes:

- (a) Preparing foundation for embankment;
- (b) Constructing roadway embankments;
- (c) Benching for side-hill embankments; and
- (d) Backfilling subexcavated areas, holes, pits, and other depressions.

### Material

**204.03** Conform to the following Subsections:

Select borrow	704.07
Select borrow (rock)	704.04
Topping	704.05
Unclassified borrow	704.06
Water	725.01

### Construction Requirements

**204.04 Preparing Foundation for Embankment Construction.** Prepare foundation for embankment construction as follows:

- (a) **Embankment less than 4 feet high over natural ground.** Break up the ground surface to a minimum depth of 6 inches by plowing or scarifying. Compact the ground surface according to Subsection 204.06.
- (b) **Embankment across ground not capable of supporting equipment.** Dump successive loads of embankment material in a uniformly distributed layer to construct the lower portion of the embankment. Limit the layer thickness to the minimum depth necessary to support the equipment.
- (c) **Embankment on an existing slope steeper than 1V:3H.** Cut horizontal benches in the existing slope to a sufficient width to accommodate placement and compaction operations and equipment. Bench the slope as the embankment is placed and compacted in layers. Begin each bench at the intersection of the original ground and the vertical cut of the previous bench.

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**204.05 Embankment Construction.** Incorporate only select borrow (rock) and unclassified borrow into the embankment as shown in the plans and directed by the CO or ERRS Response Manager. Construct embankments as follows:

**(a) General.** At the end of each day's operations, shape to drain and compact the embankment surface to a uniform cross-section. Eliminate all ruts and low spots that could hold water.

During all stages of construction, route and distribute hauling and leveling equipment over the width and length of each layer of material.

Compact embankment side slopes with a tamping foot roller, by walking with a dozer, or by over-building the fill and then removing excess material to the final slope line. For slopes 1V:1¾H or steeper, compact the slopes as embankment construction progresses.

**(b) Embankment within the roadway prism.** Place embankment material in horizontal layers not exceeding 12 inches in compacted thickness. Incorporate oversize boulders or rock fragments into the 12-inch layers by reducing them in size or placing them individually as required by (c) below. Compact each layer according to Subsection 204.06 before placing the next layer.

Material composed predominately of boulders or rock fragments too large for 12-inch layers may be placed in layers up to 24 inches thick. Incorporate oversize boulders or rock fragments into the 24-inch layer by reducing them in size or placing them individually according to (c) below. Place sufficient earth and smaller rocks to fill the voids. Compact each layer according to Subsection 204.06 before placing the next layer.

**(c) Individual rock fragments and boulders.** Place individual rock fragments and boulders greater than 24 inches in diameter as follows:

- (1) Reduce rock to less than 48 inches in the largest dimension.
- (2) Distribute rock within the embankment to prevent nesting.
- (3) Place layers of embankment material around each rock to a depth not greater than that permitted by (b) above. Fill all the voids between rocks.
- (4) Compact each layer according to Subsection 204.06 before placing the next layer.

**204.06 Compaction.** For the purpose of compaction, use AASHTO T 27 to determine the amount of material retained on a No. 4 sieve. Compact as follows:

**(a) More than 80 percent retained on a No. 4 sieve.** Adjust the moisture content to a level suitable for compaction. Fill the interstices around rock with earth or other fine material as practical. Use compression-type rollers at speeds less than 6 feet per second and vibratory rollers at speeds less than 3 feet per second. Compact each layer of material full width with one of the following and until there is no visible evidence of further consolidation.

- (1) Four roller passes of a vibratory roller having a minimum dynamic force of 40,000 pounds impact per vibration and a minimum frequency of 1000 vibrations per minute.
- (2) Eight roller passes of a 20-ton compression-type roller.
- (3) Eight roller passes of a vibratory roller having a minimum dynamic force of 30,000

pounds impact per vibration and a minimum frequency of 1000 vibrations per minute.

Increase the compactive effort for layers deeper than 12 inches as follows:

- For each additional 6 inches or fraction thereof, increase the number of roller passes in (1) above by four passes.
- For each additional 6 inches or fraction thereof, increase the number of roller passes in (2) and (3) above, by eight passes.

**(b) 50 to 80 percent retained on a No. 4 sieve.** Use AASHTO T 99 to determine the optimum moisture content of the portion of the material passing a No. 4 sieve. Multiply this number by the percentage of material passing a No. 4 sieve, and add 2 percent to determine the optimum moisture content of the material. Adjust the moisture content of material classified A-1 through A-5 to a moisture content suitable for compaction. Adjust the moisture content of material classified A-6 and A-7 to within 2 percent of the optimum moisture content.

Use compression-type rollers at speeds less than 6 feet per second and vibratory rollers at speeds less than 3 feet per second. Compact each layer of material full width according to (a) above.

**(c) Less than 50 percent retained on a No. 4 sieve.** Classify the material according to AASHTO M 145. For material classified A-1 or A-2-4, determine the maximum density according to AASHTO T 180, method D. For other material classifications, determine the optimum moisture content and maximum density according to AASHTO T 99, method C.

Adjust the moisture content of material classified A-1 through A-5 to a moisture content suitable for compaction. Adjust the moisture content of material classified A-6 and A-7 to within 2 percent of the optimum moisture content.

Use compression-type or vibratory rollers. Compact each layer of material full width to at least 95 percent of the maximum density. Determine the in-place density and moisture content according to AASHTO T 310 or other approved test procedures. When required, use AASHTO T 224 to correct for coarse particles.

**204.07 Sloping, Shaping, and Finishing.** Complete slopes, ditches, culverts, , and other underground minor structures before placing aggregate courses. Slope, shape, and finish as follows:

**(a) Sloping.** Leave all earth slopes with uniform roughened surfaces, except as described in (b) below, with no noticeable break as viewed from the road. Except in solid rock, round tops and bottoms of all slopes including the slopes of drainage ditches. Round material overlaying solid rock to the extent practical.

If a slide or slipout occurs on a cut or embankment slope, remove or replace the material, and repair or restore all damage to the work. Bench or key the slope to stabilize the slide. Reshape the cut or embankment slope to an acceptable condition.

**(b) Shaping.** Shape the subgrade to a smooth surface and to the cross-section required. Shape slopes to gradually transition into slope adjustments without noticeable breaks. At the ends of

cuts and at intersections of cuts and embankments, adjust slopes in the horizontal and vertical planes to blend into each other or into the natural ground.

**(d) Finishing.** Remove all material larger than 6 inches from the top 6 inches of the roadbed. Remove unsuitable material from the roadbed, and replace it with suitable material. Finish roadbeds that are compacted according to Subsection 204.06(b) and (c) to within  $\pm 0.05$  feet of the staked line and grade. Finish roadbeds that are compacted according to Subsection 204.06(a) to within  $\pm 0.10$  feet of the staked line and grade. Finish ditch cross-sections to within  $\pm 0.10$  feet of the staked line and grade. Maintain proper ditch drainage.

**204.15 Acceptance.** See Table 204-1 for sampling and testing requirements.

Material for embankment will be evaluated under Subsections 106.02 and 106.04.

Embankment construction will be evaluated under Subsections 106.02 and 106.04.

### **Measurement**

**204.16** Measure the Section 204 items listed in the bid schedule according to Subsection 109.02 and the following as applicable.

Measure unclassified borrow and select borrow by the cubic yard in the haul vehicle.

**Table 204-1  
Sampling and Testing Requirements**

Material or Product	Type of Acceptance (Subsection)	Characteristic	Category	Test Methods Specifications	Sampling Frequency	Point of Sampling	Split Sample	Reporting Time
Top of subgrade (204.06)	Measured and tested for conformance (106.04)	Compaction	—	AASHTO T 310 or other approved procedures	1 per 2500 yd <sup>2</sup>	In-place	—	Before placing next layer
Topping (704.05)	Measured and tested for conformance (106.04)	Classification	—	AASHTO M 145	1 per soil type	Processed material before incorporating in work	Yes, when requested	Before using in work
		Moisture-density	—	AASHTO T 180, method D <sup>(1)</sup> or T 99, method C <sup>(1)</sup>	1 per soil type	"	"	"
		Compaction	—	AASHTO T 310 or other approved procedures	1 per layer	In-place	—	—

(1) Minimum of 5 points per proctor

**Table 204-1 (continued)**  
**Sampling and Testing Requirements**

<b>Material or Product</b>	<b>Type of Acceptance (Subsection)</b>	<b>Characteristic</b>	<b>Category</b>	<b>Test Methods Specifications</b>	<b>Sampling Frequency</b>	<b>Point of Sampling</b>	<b>Split Sample</b>	<b>Reporting Time</b>
Unclassified borrow (704.06)	Measured and tested for conformance (106.04)	Classification	—	AASHTO M 145	1 per soil type	Processed material before incorporating in work	Yes, when requested	Before using in work
		Moisture-density	—	AASHTO T 180, method D <sup>(1)</sup> or T 99, method C <sup>(1)</sup>	1 per soil type	"	"	"
		Compaction	—	AASHTO T 310 or other approved procedures	1 per layer	In-place	—	Before placing next layer
Select borrow (704.07)	Measured and tested for conformance (106.04)	Classification	—	AASHTO M 145	1 per soil type	Processed material before incorporating in work	Yes, when requested	24 hours
		Gradation	—	AASHTO T 27 & T 11	"	"	"	"
		Liquid limit	—	AASHTO T 89, Method A & T87	"	"	"	"
		Moisture-density	—	AASHTO T 180, method D <sup>(1)</sup> or T 99, method C <sup>(1)</sup>	1 per soil type	"	"	"
		Compaction	—	AASHTO T 310 or other approved procedures	1 per layer	In-place	"	Before placing next layer

(1) Minimum of 5 points per proctor.

## Section 209. — STRUCTURE EXCAVATION AND BACKFILL

### Description

**209.01** This work consists of excavating material for the construction of all structures. The work includes preserving channels, shoring and bracing, dewatering, excavating, preparing foundations, bedding, and backfilling.

### Material

**209.02** Conform to the following Sections and Subsections:

Backfill material	704.03
Bedding material	704.02
Foundation fill	704.01
Unclassified borrow	704.06

### Construction Requirements

**209.03 General.** Excavate trenches to a width and length that allows room for work. When excavation is complete, request approval as to the character and suitability of the foundation material. The foundation shall provide a firm foundation of uniform density throughout its length and width.

Follow OSHA safety regulations (29 CFR, Part 1926, Subpart P, Excavation) for sloping the sides of excavations, using shoring and bracing, and for using other safety features. When sides of excavations are sloped for safety considerations, provide one copy of the design that demonstrates conformity with OSHA regulations.

Remove safety features when no longer necessary. Remove shoring and bracing to at least 2 feet below the surface of the finished ground.

Conserve suitable material for structural backfill from excavated material. Do not deposit excavated material in or near a waterway. Do not stockpile excavated material or allow equipment closer than 2 feet from the edge of the excavation.

Remove all water as necessary to perform work. Excavate to foundation grade without unduly disturbing the trench or foundation surface. Foundation grade is the elevation at the bottom of any bedding for installing the structure. Compact the foundation.

**209.04 Foundation Preparation.** Excavate any unsuitable material present at foundation grade, and replace it with foundation fill. Place foundation fill material in horizontal layers that, when compacted, do not exceed 6 inches in depth. Compact the foundation fill material according to Subsection 209.07.

**209.05 Bedding for pipe culverts.** Level the foundation. Place 4 inches of un-compacted bedding material over the foundation in a layer of uniform thickness. Place the culvert on un-compacted bedding layer. Backfill according to Subsection 209.06.

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**209.06 Backfill for pipe culverts.** Place and compact material in evenly balanced layers on each side of each pipe culvert. Place and compact backfill material to a height of 12 inches above the top of the pipe. Complete the backfilling of the trench with unclassified borrow. Place the material in layers that, when compacted, do not exceed 6 inches in thickness. Compact each layer according to Subsection 209.07.

**209.07 Compacting.** Determine optimum moisture content and maximum density according to AASHTO T 99, method C. Adjust the moisture content of the backfill material to a moisture content suitable for compaction.

Compact material placed in all layers to at least 95 percent of the maximum density. Determine the in-place density and moisture content according to AASHTO T 310 or other approved test procedures.

Do not apply density requirements as measured by AASHTO T 310 to material that is incapable of being tested or compacted to maximum values determined by AASHTO T 99. For these materials, fill the voids around the rock in each layer with earth or other fine material. Compact each layer, full width, until there is no visible evidence of further consolidation.

**209.08 Acceptance.** See Table 209-1 for sampling and testing requirements.

Material for backfill, bedding, and foundation fill will be evaluated under Subsections 106.02 and 106.04.

### **Measurement**

**209.09** Do not measure structure excavation and backfill.



**Table 209-1  
Sampling and Testing Requirements**

<b>Material or Product</b>	<b>Type of Acceptance (Subsection)</b>	<b>Characteristic</b>	<b>Category</b>	<b>Test Methods Specifications</b>	<b>Sampling Frequency</b>	<b>Point of Sampling</b>	<b>Split Sample</b>	<b>Reporting Time</b>
Backfill material (704.03)	Measured and tested for conformance (106.04)	Gradation	—	AASHTO T 27 & T 11	1 per soil type	Source of material	Yes	Before using in work
		Moisture-density	—	AASHTO T 99, method C <sup>(1)</sup>	"	"	"	"
		Compaction	—	AASHTO T 310 or other approved procedures	2 per lift	In-place	—	Before placing next layer
Bedding material (704.02)	Measured and tested for conformance (106.04)	Moisture-density	—	AASHTO T 99, method C <sup>(1)</sup>	1 per soil type	Source of material	Yes	Before using in work
		Compaction	—	AASHTO T 310 or other approved procedures	2 per lift	In-place	—	Before placing next layer
		Classification	—	AASHTO M 145	1 per soil type	Processed material before incorporating into work	Yes, when requested	Before using in work

(1) Minimum of 5 points per proctor.

## Section 308. — MINOR CRUSHED AGGREGATE

### Description

**308.01** This work consists of furnishing and placing crushed aggregate for roadway aggregate courses.

### Material

**308.02** Conform to the following Subsections:

Crushed aggregate	703.01
Water	725.01

### Construction Requirements

**308.03 Preparing Surface.** Repair soft and unstable areas. Remove all organic, deleterious, or oversize material larger than 6 inches from the top 6 inches of subgrade. Dispose of waste. Remove surface irregularities and shape to provide a uniform surface. Finish earth surfaces to within 0.05 feet and rock surfaces to within 0.10 feet of the required line, cross-section, and grade. Compact according to Subsection 204.06.

**308.04 Placing Crushed Aggregate.** Mix the aggregate and adjust the moisture content to obtain a uniform mixture with a moisture content suitable for compaction. Spread and shape the mixture on the prepared surface in a uniform layer.

Do not place the mixture in a layer exceeding 6 inches in compacted thickness. When more than one layer is necessary, compact each layer according to Subsection 308.05 before placing the next layer.

**308.05 Compacting and Finishing Crushed Aggregate.** Determine the maximum density of the mixture according to AASHTO T 180, method D.

Compact each layer full width. Roll from the sides to the center, parallel to the centerline of the road.

Compact each layer to at least 95 percent of maximum density. Determine the in-place density and moisture content according to AASHTO T 310 or other approved test procedures. Finish the surface to within  $\pm 0.05$  feet from staked line and grade elevation.

Correct all defective areas by loosening the material, adding or removing material, reshaping, and compacting.

**308.06 Acceptance.** See Table 308-1 for sampling and testing requirements.

Crushed aggregate will be evaluated under Subsections 106.02 and 106.03. Furnish a production certification including gradation and quality properties for each source.

Contract Requirements

Project: Avery Landing, St. Joe River Road, ID PFH 50(9)

Construction of roadway aggregate courses will be evaluated under Subsections 106.02 and 106.04. Evaluate compaction under Section 106.04.

**Measurement**

**308.07** Measure the Section 308 items listed in the bid schedule according to Subsection 109.02 and the following as applicable.

**Table 308-1  
Sampling and Testing Requirements**

Material or Product	Type of Acceptance (Subsection)	Characteristic	Category	Test Methods Specifications	Sampling Frequency	Point of Sampling	Split Sample	Reporting Time
Crushed aggregate	Measured and tested for conformance (106.04)	Moisture-density	—	AASHTO T 180, method D <sup>(1)</sup>	1 for each aggregate supplied	Production output or stockpile	—	Before using in work
		Compaction	—	AASHTO T 310 or other approved procedures	1 per 500 tons	In-place	—	Before placing next layer

(1) Minimum of 5 points per proctor.

## Section 404. — MINOR HOT ASPHALT CONCRETE

### Description

**404.01** This work consists of constructing minor hot asphalt concrete for sidewalks, paved waterways, curbs, and roadways.

### Construction Requirements

**404.02 Composition of Mix (Job-Mix Formula).** Provide a hot asphalt concrete mix composed of crushed stone or gravel and asphalt binder mixed in an approved plant. Use an aggregate gradation and asphalt binder of a quality conforming to those normally used locally by either Federal or State agencies for the type of work being constructed.

Submit the strength, quality, and gradation specifications for the asphalt concrete mix. Include copies of laboratory test reports that demonstrate the properties of the aggregates, asphalt binder, additives, and mix meet Federal or State agency specifications. Also submit the maximum specific gravity (density) of the mix as determined by AASHTO T 209.

**404.03 Surface Preparation.** Clean the existing surface of all loose material, dirt, or other deleterious substances by approved methods, as applicable. Apply an asphalt tack coat to contact surfaces of pavements, curbs, gutters, manholes, and other structures according to Section 412.

**404.04 Weather Limitations.** Place asphalt concrete on a dry, unfrozen surface when the air temperature in the shade is at least 35 °F and rising.

**404.05 Hauling.** Use vehicles with tight, clean, and smooth metal beds for hauling asphalt concrete mixes.

Coat the beds with an approved material to prevent the mix from adhering to the beds. Do not use petroleum derivatives or other coating material that contaminates or alters the characteristics of the mix. Drain the bed before loading.

Equip each truck with a canvas cover or other suitable material of sufficient size to protect the mix from the weather. When necessary to maintain temperature, use insulated truck beds and securely fastened covers. Provide access ports or holes for checking temperature of asphalt concrete mix in the truck.

### 404.06 Equipment

(a) Furnish pavers that are:

- (1) Self-contained, power-propelled units with adjustable vibratory screeds with full-width screw augers;
- (2) Heated for the full width of the screed;

Contract Requirements

Project: Avery Landing, St. Joe River Road, ID PFH 50(9)

- (3) Capable of spreading and finishing courses of asphalt concrete mix in widths at least 12 inches more than the width of one lane;
- (4) Equipped with a receiving hopper having sufficient capacity to ensure a uniform spreading operation;
- (5) Equipped with automatic feed controls, which are properly adjusted to maintain a uniform depth of material ahead of the screed;
- (6) Operable at forward speeds consistent with satisfactory mix lay down;
- (7) Capable of producing a smooth finished surface without segregating, tearing, shoving, or gouging the mat; and
- (8) Equipped with automatic screed controls with sensors capable of sensing grade from an outside reference line, sensing the transverse slope of the screed, and providing the automatic signals that operate the screed to maintain grade and transverse slope.

**404.07 Placing.** Place the mix with a mechanical paver meeting the requirements of Subsection 404.06. For roadway paving, do not place lifts thicker than 4 inches. In areas where mechanical spreading and finishing is impractical, spread and finish each course by hand raking, screeding, or by other approved methods. Construct a surface that is uniform in texture and cross-section.

Complete pavement construction of adjacent traffic lanes to the same elevation within 24 hours. At connections to existing pavements and previously placed lifts, make the transverse joints vertical to the depth of the new pavement. Form transverse joints by cutting back the previous run to expose the full-depth course.

To both transverse and longitudinal joints, apply an asphalt tack coat to the joint edge according to Section 412.

Place the asphalt concrete mix as continuously as possible. Do not pass rollers over any unprotected edge of a freshly laid mix.

**404.08 Compacting.** Compact the mix to a minimum of 90 percent of maximum specific gravity (density). Complete compaction before the mix temperature falls below 160 °F. Determine density by nuclear gauge.

Compact areas that are not accessible to rollers by other approved methods.

**404.09 Pavement Smoothness.** Use a 10-foot metal straightedge to measure at right angles and parallel to the centerline. Defective areas are surface deviations in excess of 1/4 inch in 10 feet between any two contacts of the straightedge with the surface. Correct defective areas using approved methods.

**404.10 Acceptance.** See Table 404-1 for sampling and testing requirements.

Minor hot asphalt concrete mixture will be evaluated under Subsections 106.02 and 106.03.

Minor hot asphalt concrete construction work will be evaluated under Subsections 106.02 and 106.04.

Contract Requirements

Project: Avery Landing, St. Joe River Road, ID PFH 50(9)

**Measurement**

**404.10** Measure the Section 404 items listed in the bid schedule according to Subsection 109.02.

**Table 404-1**  
**Sampling and Testing Requirements**

Material or Product	Type of Acceptance (Subsection)	Characteristic	Category	Test Methods Specifications	Sampling Frequency	Point of Sampling	Split Sample	Reporting Time
Asphalt mixture (404.07)	Measured and tested for conformance (106.04)	Compaction (roadway paving)	—	AASHTO T 310	1 per 1200 yd <sup>2</sup>	In-place	—	Upon completing tests

## **Section 412. — ASPHALT TACK COAT**

### **Description**

**412.01** This work consists of applying an emulsified asphalt tack coat.

Tack coat emulsified asphalt grade is designated as shown in AASHTO M 140 or M 208.

### **Material**

**412.02** Conform to the following Subsection:

Emulsified asphalt	702.01
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### **Construction Requirements**

**412.03 Equipment.** Furnish equipment as follows:

**(a) Asphalt distributor.**

- (1) Capable of heating asphalt evenly;
- (2) Adjustable full circulation spray bar to 15-foot width;
- (3) Positive controls including tachometer, pressure gauge, volume measuring device, or calibrated tank to uniformly deposit asphalt over the full width within 0.02 gallons per square yard of the required rate; and
- (4) Thermometer for measuring the asphalt temperature in the tank.

**(b) Other equipment.** Other equipment of proven performance may be used in addition to or in lieu of the specified equipment when approved by the CO.

**412.04 Surface Preparation.** Clean the existing surface of all loose material, dirt, or other deleterious substances by approved methods. When the surface is concrete, remove excess joint and crack filler.

**412.05 Weather Limitations.** Apply asphalt tack coat on a dry, unfrozen surface when the air temperature in the shade is above 35 °F and rising.

**412.06 Asphalt Application.** Where using slow-setting emulsified asphalt, dilute by adding an equal amount of water to the emulsified asphalt.

Calibrate the asphalt distributor spray bar height, nozzle angle, and pump pressure and check longitudinal and transverse spread rates weekly according to ASTM D 2995. If different asphalt distributors are used, calibrate each before use on the project. Ensure that the length of the spread is no more than can be covered with aggregate immediately after application.



Protect the surfaces of nearby objects to prevent spattering or marring. Spread building paper on the surface for a sufficient distance from the beginning and end of each application so the flow through the distributor nozzles may be started and stopped on the paper.

The CO will approve the exact application rate, temperature, and area to be treated before application and may make adjustments for variations in field conditions. Apply the asphalt uniformly with an asphalt distributor. Move distributor forward at the proper application speed at the time the spray bar is opened. Use care not to apply excess asphalt at the junction of spreads.

Correct skipped areas or deficiencies. Remove and dispose of paper or other material used.

Apply the asphalt at a rate of 0.03 to 0.15 gallons per square yard. When a tack coat cannot be applied with an asphalt distributor spray bar, apply the tack coat uniformly and completely by fogging with a hand spray attachment or by another approved method.

If excess asphalt material is applied, squeegee the excess from the surface. Allow the tacked surfaces to completely cure before placing the covering course. Place the covering course within 4 hours of placing the tack coat.

**412.07 Acceptance.** Emulsified asphalt will be evaluated under Subsections 106.02, 106.03, and 702.01.

Construction of the tack coat will be evaluated under Subsections 106.02 and 106.04.

### **Measurement**

**412.08** Measure the Section 412 items listed in the bid schedule according to Subsection 109.02 and the following as applicable.

Measure tack coat including water added for dilution.

## **Section 602. — CULVERTS AND DRAINS**

### **Description**

**602.01** This work consists of constructing culverts.

### **Material**

**602.02** Conform to the following Section and Subsections:

Metallic-coated corrugated steel pipe                      707.01

### **Construction Requirements**

**602.03 General.** Furnish culvert pipe with a wall thickness not less than that shown on the plans or determined from the fill-height tables included in the plans. Use the same material and coating on all contiguous pipe sections and special sections such as elbows and branch connections. For culvert extensions, furnish the same material as the existing culvert.

The plans show the size, approximate location, and length of culverts. Determine final location, skew, length, elevations, and grade according to Subsection 152.03(f). Do not order culvert material until the CO has accepted the final structure size, length, and alignment.

Excavate and backfill according to Section 209.

**602.04 Laying Metal Pipe.** Lay pipe with outside laps of circumferential joints upgrade and longitudinal laps positioned other than in the invert. Place elongated pipes with major axis within 5 degrees of vertical.

Join pipe sections together with soil tight bell and spigot joints or coupling bands according to AASHTO M 196.

**602.08 Acceptance.** Material for culverts furnished will be evaluated under Subsections 106.02 and 106.03.

Installation of culverts will be evaluated under Subsections 106.02 and 106.04.

Excavation and backfill will be evaluated under Section 209.

### **Measurement**

**602.09** Measure the Section 602 items listed in the bid schedule according to Subsection 109.02 and the following as applicable.

Measure pipe culverts by the linear foot along the invert.

Contract Requirements

Project: Avery Landing, St. Joe River Road, ID PFH 50(9)

## Section 634. — PERMANENT PAVEMENT MARKINGS

### Description

**634.01** This work consists of applying permanent pavement markings and raised pavement markers on the completed pavement.

Pavement markings are designated as follows:

Type A— Conventional traffic paint with type 1 glass beads

### Material

**634.02** Conform to the MUTCD and the following Subsections:

Conventional traffic paint	718.01
Glass beads	718.02

### Construction Requirements

**634.03 General.** Where existing and final pavement marking locations are identical, stake the limits of all existing pavement markings before any pavement work. Upon completion of the final surface course, establish line limits for the new pavement for approval before marking. Establish markings according to the MUTCD.

Remove loose particles, dirt, tar, grease, and other deleterious material from the surface to be marked. Apply markings to a clean, dry surface according to the MUTCD.

At least 7 days before applying pavement markings, furnish a written copy of the marking manufacturer's recommendations for use. A field demonstration may be required to verify the adequacy of recommendations.

Ship marking material in appropriate containers plainly marked with the following information, as appropriate, for the material being furnished:

- (a) Manufacturer's name and address;
- (b) Name of product;
- (c) Lot/batch numbers;
- (d) Color;
- (e) Net mass and volume of contents;
- (f) Date of manufacture;

Contract Requirements

Project: Avery Landing, St. Joe River Road, ID PFH 50(9)

- (g) Date of expiration;
- (h) Statement of contents (if mixing of components is required);
- (i) Mixing proportions and instructions; and
- (j) Safety information.

Apply pavement markings in the direction of traffic according to the manufacturer's recommendations. Apply all markings to provide a clean-cut, uniform, and workmanlike appearance by day and night.

Make lines 4 inches wide. Separate double lines with a 4-inch space.

Protect marked areas from traffic until the markings are dried to no-tracking condition. Remove all tracking marks, spilled marking material, markings in unauthorized areas, and defective markings.

**634.04 Conventional Traffic Paint (Type A).** Apply paint when the pavement and air temperatures are above 40 °F. Spray paint at 15 mil minimum wet film thickness before glass beads or at a rate of 107square feet per gallon. Immediately apply type 1 glass beads on the paint at a minimum rate of 6 pounds per gallon of paint.

On new asphalt pavements or new asphalt surface treatments, apply two coats. Apply the first coat at 360 square feet per gallon and the second coat at 150 square feet per gallon.

**634.12 Acceptance.** Material for permanent pavement markings will be evaluated under Subsections 106.02 and 106.03.

Placement of permanent pavement marking will be evaluated under Subsections 106.02 and 106.04.

### Measurement

**634.13** Measure the Section 634 items listed in the bid schedule according to Subsection 109.02 and the following as applicable.

When two coats of paint are required, measure each coat.

When pavement markings are measured by the linear foot or station, measure the length of line applied along the centerline of each 4-inch-wide line applied regardless of color. Measure solid pavement lines from end to end of each continuous line.

## **Section 635. — TEMPORARY TRAFFIC CONTROL**

### **Description**

**635.01** This work consists of furnishing, maintaining, relocating, and removing temporary traffic control devices and services as ordered for the control and protection of public traffic through the project.

Barricade are designated as shown in the MUTCD.

### **Material**

**635.02** Conform to the MUTCD.

### **Construction Requirements**

**635.03 General.** Install and maintain temporary traffic control devices adjacent to and within the project as required by the traffic control plan, Section 156, and the MUTCD. Install and maintain traffic control devices as follows:

- (a) Furnish and install traffic control devices before the start of construction operations.
- (b) Install only those traffic control devices needed for each stage or phase.
- (c) Relocate temporary traffic control devices as necessary.
- (d) Remove devices that no longer apply to the existing conditions.
- (e) Immediately replace any device that is lost, stolen, destroyed, or inoperative.
- (f) Keep temporary traffic control devices clean.
- (g) Furnish and maintain traffic control devices that meet the "acceptable" standard described in Quality Standards for Work Zone Traffic Control Devices published by ATSSA. Amend the ATSSA standards as follows:
  - (1) Repair or remove and replace "marginal" devices within 48 hours; and
  - (2) Repair or remove and replace "unacceptable" devices immediately.
- (h) Remove all temporary traffic control devices upon contract completion or when approved.
- (i) Furnish temporary traffic control devices that meet the NCHRP Report 350, Recommended Procedures for the Safety Performance Evaluation of Highway Features, for crashworthiness standards as applicable.

**635.04 Barricades.** Perform the work described under MUTCD Part 6. Use type III, VII, VIII, or IX retroreflective sheeting.

Contract Requirements

Project: Avery Landing, St. Joe River Road, ID PFH 50(9)

**635.05 Cones and Tubular Markers.** Perform the work described under MUTCD Part 6. Use 28-inch cones or tubular markers. Use type III, or VI retroreflective sheeting.

**635.06 Construction Signs.** Use type III, VII, VIII, or IX retroreflective sheeting. For roll-up signs, use type VI retroreflective sheeting. Remove or completely cover all unnecessary signs with metal, plywood, or other acceptable material.

Use crashworthy posts within the traversable area adjacent to traffic.

**635.08 Drums.** Perform work described in MUTCD Part 6. Use plastic drums that are approximately 36 inches high and a minimum of 18 inches in diameter. Use type III or VI retroreflective sheeting.

**635.09 Flaggers.** Use flaggers certified by the American Traffic Safety Services Association, the National Safety Council, the International Municipal Signal Association, a state agency, or other acceptable organization. Perform the work described under MUTCD Part 6. Use type III, VII, VIII, or IX retroreflective sheeting on flagger paddles. Do not use flags.

**635.10 Acceptance.** Material for temporary traffic control devices will be evaluated under Subsections 106.02 and 106.03.

Placement of temporary traffic control devices will be evaluated under Subsections 106.02 and 106.04.

Temporary traffic control services will be evaluated under Subsection 106.02.

### **Measurement**

635.26 Measure the Section 635 items listed in the bid schedule according to Subsection 109.02 and the following as applicable when ordered by the CO or ERRS and installed.

Measure flaggers, for each hour a person is actually flagging. Round portions of an hour up to the half hour. Measure time in excess of 40 hours per week at the same rate as the first 40 hours.

## Section 636. — SIGNAL, LIGHTING, AND ELECTRICAL SYSTEMS

### Description

**636.01** This work consists of installing conduits for future systems.

### Material

**636.02** Conform to the following Subsections:

Conduit	721.01
Pull Wire	721.02

### Construction Requirements

**636.03 General.** Furnish pipe and fittings of one material. Excavate and backfill according to Section 209.

**636.04 Conduit.** Cut conduit so the ends are smooth. Connect conduit sections with couplings to butt the ends of both conduits squarely against each other inside the couplings.

Install conduit continuous with a minimum of couplings to permit pulling conductors. Furnish no less than four pull wires for future installation.

Remove and replace crushed, deformed, or damaged conduit. Maintain conduits clean and dry and protect ends of conduit with plugs, caps, or fittings.

**636.11 Acceptance.** Material will be evaluated under Subsections 106.02 and 106.03.

Installation will be evaluated under Subsections 106.02 and 106.04.

Structural excavation and backfill will be evaluated under Section 209.

### Measurement

**636.12** Measure the Section 636 items listed in the bid schedule according to Subsection 109.02 and the following as applicable.

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## Section 702. — ASPHALT MATERIAL

**702.01 Emulsified Asphalt.** Apply asphalt within the temperature ranges shown in Table 702-1.

An equivalent anionic grade emulsion may be substituted for a cationic grade and vice versa. The sieve test in AASHTO M 140 and M 208 is not required.

**(a) Anionic emulsions.** Conform to AASHTO M 140.

**(b) Cationic emulsions.** Conform to AASHTO M 208.

**Table 702-1**  
**Application Temperatures - Range °F**

Type and Grade of Asphalt	Temperature Ranges Minimum – Maximum
	Spraying Temperatures
<b>Emulsified asphalt</b>	
SS-1, 1h, CSS-1, 1h	70 - 160

## **Section 703. — AGGREGATE**

**703.01 Crushed Aggregate.** Furnish hard, durable particles or fragments of crushed stone or gravel conforming to the size and quality requirements for crushed aggregate material normally used locally in the construction and maintenance of highways by Federal or State agencies.

Furnish crushed aggregate with a maximum size of 1 inch as determined by AASHTO T 27 and T 11. Furnish crushed aggregate uniformly graded from coarse to fine and free of organic matter, lumps or balls of clay, and other deleterious matter.

## Section 704. — SOIL

**704.01 Foundation Fill.** Furnish granular material free of excess moisture, frozen lumps, roots, sod, or other deleterious material and conforming to the following:

- |   |          |
|---|----------|
| (a) Maximum particle size                                   | 2 inches |
| (b) Soil classification, AASHTO M 145                       | A-1-a    |
| (c) Material passing No. 200 sieve,<br>AASHTO T 27 and T 11 | 6% max.  |

**704.02 Bedding Material.** Furnish a well graded, free draining material free of excess moisture, muck, frozen lumps, roots, sod, or other deleterious material conforming to the following:

- |   |   |
|---|---|
| (a) Maximum particle size                                   | 1/2 inch or half the corrugation<br>depth, whichever is smaller |
| (b) Material passing No. 200 sieve,<br>AASHTO T 27 and T 11 | 10% max.  |

**704.03 Backfill Material.** Furnish a well-graded, compactable material free of excess moisture, muck, frozen lumps, roots, sod, or other deleterious material conforming to the following:

**(a) For all structures and pipes other than plastic pipe:**

- |                                       |                  |
|---------------------------------------|------------------|
| (1) Maximum particle size             | 3 inches         |
| (2) Soil classification, AASHTO M 145 | A-1, A-2, or A-3 |

**(b) For plastic pipe:**

- |                                       |                              |
|---------------------------------------|------------------------------|
| (1) Maximum particle size             | 1½ inches                    |
| (2) Soil classification, AASHTO M 145 | A-1, A-2-4, A-2-5,<br>or A-3 |

**704.04 Select Borrow (rock).** Furnish granular material free of excess muck, frozen lumps, roots, sod, or other deleterious material that is containing 95 percent or more, by volume, rock particles greater than 50 millimeters.

**704.05 Topping.** Furnish a granular material free of excess moisture, muck, frozen lumps, roots, sod, or other deleterious material conforming to the following:

- |                                       |              |
|---------------------------------------|--------------|
| (a) Maximum particle size             | 4 inches     |
| (b) Soil classification, AASHTO M 145 | A-1 or A-2-4 |

**704.06 Unclassified Borrow.** Furnish granular material free of excess moisture, muck, frozen lumps, roots, sod, or other deleterious material conforming to the following:

- (a) Maximum particle size 24 inches
- (b) Soil classification, AASHTO M 145 A-1, A-3, or A-2-4

**704.07 Select Borrow.** Furnish granular material, well graded from coarse to fine, free of excess moisture, muck, frozen lumps, roots, sod, or other deleterious material conforming to the following:

- (a) Gradation Table 704-1
- (b) Liquid limit, AASHTO T 89 30 max.

**Table 704-1**  
**Select Borrow Gradation**

<b>Sieve Size</b>	<b>Percent by Mass Passing Designated Sieve (AASHTO T 27 &amp; T 11)</b>
3 inch	100
1 inch	70-100
No. 4	30-70
No. 200	0-5

## **Section 707. — METAL PIPE**

**707.01 Metallic-Coated Corrugated Steel Pipe.** Furnish pipe, special sections (such as elbows, branch connections, and prefabricated flared end sections), and coupling bands conforming to AASHTO M 36 and either AASHTO M 218, M 274, or M 289 for the dimensions and thicknesses specified.



## **Section 721. — ELECTRICAL AND ILLUMINATION MATERIAL**

**721.01 Conduit.** Furnish nonmetallic conduit and duct couplings, elbows, bends, and nipples. Furnish rigid PVC, heavy wall conduit conforming to UL 651. For solvent cement to join conduit, conform to ASTM D 2564.

**721.02 Pull Wire.** Furnish nylon “jet-line” or approved equal.

**Section 725. — MISCELLANEOUS MATERIAL**

**725.01 Water.** Furnish water free of substances detrimental to the work.



# Plans

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A		M.L.		M.L.		PROJECT		SHEET	
4c		M.P.		max.		ID		NUMBER	
6s		MGAL		min.		STATE		A.2	
about.		mon.		N		PFH 50(9)			
ADT		north		normal crown		ID			
AH		o. c.		o. to o.		STATE			
appr.		OG		point of curve		ID			
BK		PC		point of compound curve		ID			
BM		PCC		point of curve to spiral		ID			
BP		PCS		point of intersection		ID			
br.		PI		point on curve		ID			
brg.		POC		point on spiral		ID			
cc or c. to c.		POS		point on tangent		ID			
C		POT		point of tangent to spiral		ID			
C/C		PS		point of spiral to curve		ID			
C/C		PST		point of spiral to tangent		ID			
C/C		PT		point of tangent		ID			
CUFT		pvm.		radius		ID			
CULV.		R		range		ID			
CULD		R/W		right-of-way		ID			
D		roay.		roadway		ID			
D/HV		reinfr.		reinforcement		ID			
dia.		reqd.		required		ID			
diag.		rt. or RT		route		ID			
diaph.		re.		seasonal average daily traffic		ID			
dist.		S		point of spiral to curve		ID			
drwg(s).		SC		section		ID			
E		shldr.		slurry unit		ID			
e		SLRY		spacing, spaces or spaced		ID			
E/94.16 ft		spa.		square foot		ID			
elev.		SQFT		square yard		ID			
emb.		SQYD		point of spiral to reverse spiral		ID			
EP		SRS		point of spiral to spiral (no curve)		ID			
EQ or eq.		SS		point of spiral to tangent		ID			
ER		ST		station		ID			
EW		STA, Sta.		standard		ID			
exc.		std.		stringer		ID			
exp. ft.		sigr.		structural		ID			
fin.		struc.		point of spiral to tangent spiral		ID			
fig.		sym.		symmetrical		ID			
fig.		T		tangent distance		ID			
fig.		T		township		ID			
fig.		TBM		temporary bench mark		ID			
ga.		thd.		thread		ID			
galv.		TS		tangent distance (spiral curve)		ID			
galv.		typ.		typical		ID			
hdwl.		V		design speed		ID			
hex.		VPH		vehicles per hour		ID			
HW		VPI		vertical point of intersection		ID			
ID		W		west		ID			
jt.		y22		square yard		ID			
L		y25		cubic yard(s)		ID			
lam.									
lat.									
LNFT									
long.									
LPSM									
Ls									
lt. or LT									
LW									

# NOTE:

- Other symbols used in the plans will be shown in a legend on the appropriate plan sheet.

North Arrow		PROPOSED	
STATE	PROJECT	EXISTING	
ID	PH 50(9)		

STATE	PROJECT	SHEET
ID	PFH 50(9)	NUMBER
		B.1

## SUMMARY OF QUANTITIES

PLAN SHEET SECTION ----->>		SECTION C TYPICAL SECTIONS	SECTION D PLAN AND PROFILE	SECTION E ESTIMATED QUANTITY									
				PLAN		BID SCHEDULE							
ITEM	DESCRIPTION	UNIT											
15101-0000	MOBILIZATION	LPSM										0	All
15101-0001	STANDBY	DAY										0	5
15201-0000	CONSTRUCTION SURVEY AND STAKING	LPSM										0	All
15301-0010	CONTRACTOR QUALITY CONTROL AND ASSURANCE	LPSM										0	All
15401-0000	CONTRACTOR TESTING	LPSM										0	All
20403-0000	UNCLASSIFIED BORROW	CUYD	8,411									8,411	8,500
20410-0000	SELECT BORROW	CUYD	833									833	850
20410-0000	SELECT BORROW (ROCK)	CUYD	11,071									11,071	11,100
30802-2000	ROADWAY AGGREGATE, METHOD 2	TON	682.0									682.0	700.0
40401-0000	MINOR HOT ASPHALT CONCRETE	TON	295.0									295.0	300.0
41201-1000	TACK COAT GRADE CSS-1, CSS-1H, SS-1, OR SS-1H	TON	0.8									0.8	1.0
60201-1000	36-INCH PIPE CULVERT	LNFT		66.0								66.0	70.0
63401-0100	PAVEMENT MARKINGS, TYPE A, SOLID (YELLOW)	LNFT		2,640								2,640	2,700
63401-0100	PAVEMENT MARKINGS, TYPE A, SOLID (WHITE)	LNFT		2,640								2,640	2,700
63501-0000	TEMPORARY TRAFFIC CONTROL	LPSM		All								All	All
63509-1000	TEMPORARY TRAFFIC CONTROL, FLAGGER	IX HR RAT		80.0								80.0	80.0
63610-2800	CONDUIT, 4-INCH, PVC	LNFT		660.0								660.0	660.0

STATE	PROJECT	SHEET
ID	PFH 50(9)	NUMBER
		C.1

TYPICAL SECTION QUANTITIES

Item Number	Description	Total	Unit	Remarks
20403-0000	Unclassified borrow	8,411	CUYD	
20410-0000	Select borrow	833	CUYD	J/
20410-0000	Select borrow (rock)	11,071	CUYD	
30802-2000	Roadway aggregate, method 2	682.0	TON	J/
40401-0000	Minor hot asphalt concrete	295.0	TON	Based on 1.97 TON/CUYD
41201-1000	Tack coat grade CSS-1, CSS-1H, SS-1, or SS-1H	0.8	TON	Based on 1.94 TON/CUYD
			TON	Based on 0.1 GAL/SQYD, and 240 GAL/TON

FOOTNOTE:

J/ See sheet C.2 for details.

TABULATION OF TYPICAL SECTION QUANTITIES



PLAN QUANTITIES				
Item Number	Description	Total	Unit	Remarks
60201-1000	36-inch Pipe culvert	66.00	LNFT	2/
63501-0000	Temporary traffic control	All	LPSM	
63509-1000	Temporary traffic control, flagger	80.0	FIX HR RATE	
63610-2800	Conduit, 4-inch, PVC	660.00	LNFT	

PAVEMENT MARKING QUANTITIES 1/ 2/ 3/ 4/		
Item No.	Description	Unit
63401-0300	Pavement markings, type B, solid (white)	LNFT
63401-0300	Pavement markings, type B, solid (yellow)	LNFT

FOOTNOTE:

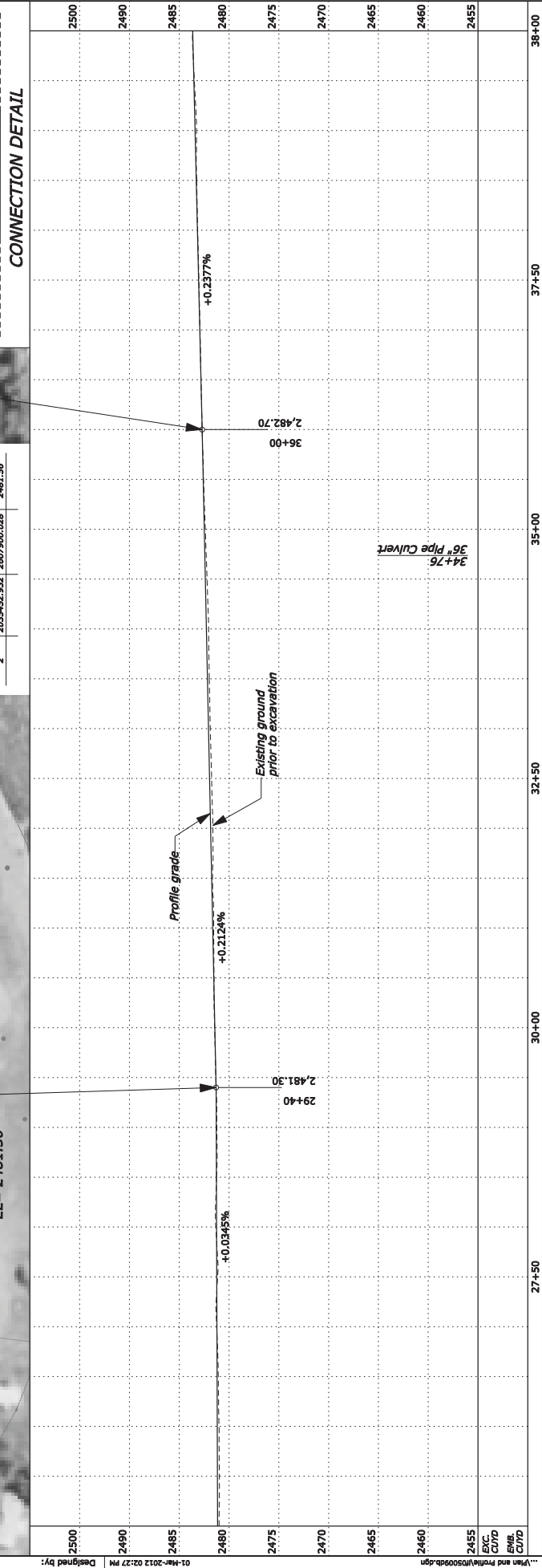
- 1/ Adjust to meet field conditions as approved by CO or ERRS.
- 2/ Allowable pipe material is Galvanized Steel. Steel pipe minimum wall thickness is as required by Std. 602-1 fill height table.
- 3/ Double application in accordance with Subsection 634.05.
- 4/ Match adjacent pavement marking layout.

TABULATION OF PLAN AND  
PROFILE QUANTITIES



# PLAN AND PROFILE LEGEND:

- Line to be constructed
- Culvert with inlet/outlet ditch
- Delineated contamination area



## CONNECTION DETAIL



METAL ROUND PIPE CULVERT

FILL HEIGHT AND METAL THICKNESS TABLE FOR HELICAL LOCKSEAM AND WELDED SEAM PIPE CULVERT

STEEL															
PIPE SIZE DIAMETER INCHES	MINIMUM COVER INCHES	2½" x ½" CORRUGATIONS				3" x 1" CORRUGATIONS									
		METAL THICKNESS (INCH/GAGE)				METAL THICKNESS (INCH/GAGE)									
		MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE (FEET)				MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE (FEET)									
12	12	100	100	100	100	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8
15	12	100	100	100	100	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8
18	12	100	100	100	100	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8
21	12	100	100	100	100	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8
24	12	100	100	100	100	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8
30	12	85	100	100	100	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8
36	12	71	89	100	100	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8
42	12	61	76	100	100	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8
48	12	53	66	93	100	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8
54	12	59	83	100	100	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8
60	12		74			0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8
66	12			97	100	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8
72	12			80	97	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8
78	12				87	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8
84	12				75	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8
90	12				32	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8
96	12					0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8
102	18				36	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8
108	18					0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8
114	18					0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8
120	18					0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8
126	18					0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8
132	18					0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8
138	18					0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8
144	18					0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8	0.064/16.0	0.079/14.0	0.091/12.0	0.138/10	0.168/8

ALUMINUM									
PIPE SIZE DIAMETER INCHES	MINIMUM COVER INCHES	2½" x ½" CORRUGATIONS				3" x 1" CORRUGATIONS			
		METAL THICKNESS (INCH/GAGE)				METAL THICKNESS (INCH/GAGE)			
		MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE (FEET)				MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE (FEET)			
12	12	100	100	100	100				
15	12	100	100	100	100				
18	12	100	100	100	100				
21	12	88	100	100	100				
24	12	77	97	100	100				
30	12	62	77	100	100	71	89	100	100
36	12	52	64	90	100	59	74	100	100
42	12	44	55	77	99	100	51	64	89
48	12			67	87	100	44	56	78
54	18			54	71	88	39	50	69
60	18				57	72	35	45	62
66	18					58	32	40	56
72	18					45	30	37	55
78	24							34	48
84	24								44
90	24								59
96	24								70
102	24								65
108	24								61
114	24								55
120	24								42
									50
									45
									40

NOTE:

- When directed, camber pipe culverts upward from a chord through the inlet and outlet inverts an ordinate amount equal to 1% of the pipe length. Develop camber on a parabolic curve. If the midpoint elevation on the parabolic curve as designed exceeds the elevation of the inlet invert, reduce the amount of camber or increase the pipe culvert gradient.
- Fill heights exceeding 100 feet require special analysis by the CO.
- The fill heights in the table are for helical lockseam and welded seam pipe only. Fill heights for culvert pipe with annular corrugations are more restrictive than those of helical lockseam and welded seam pipe. Obtain approval before furnishing annular corrugation pipe.
- Measure minimum cover from the top of the pipe culvert to the subgrade for flexible pavements, and to the top of the pavement for rigid pavements. Measure maximum fill height from the top of the pipe to the top of the pavement for both flexible and rigid pavement.

METAL PIPE ARCH CULVERT

FILL HEIGHT AND METAL THICKNESS TABLE FOR HELICAL LOCKSEAM AND WELDED SEAM PIPE CULVERT

STEEL							
PIPE ARCH SIZE SPAN X RISE INCHES	EQUI- VALENT DIAMETER INCHES	MINIMUM CORNER RADIUS INCHES	MINIMUM COVER INCHES	2 1/2" x 1/2" CORRUGATIONS		3" x 1" CORRUGATIONS METAL THICKNESS (INCH/GAGE) 0.064/16.0,0.079/14.0,0.109/12.0,1.38/10.0,0.168/8.0,0.079/14.0,0.109/12.0,1.38/10.0,0.168/8.0	5" x 1" CORRUGATIONS
				METAL THICKNESS (INCH/GAGE)			
				MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE (FEET)			
17 x 13	15	3	12	13			
21 x 15	18	3	12	12			
24 x 18	21	3	12	13			
28 x 20	24	3	12	13			
35 x 24	30	3	12	12			
42 x 29	36	3.5	12	12			
49 x 33	42	4	12	12			
57 x 38	48	5	12	12			
60 x 46	54	8	15			21	21
64 x 43	54	6	12	12			
66 x 51	60	9	15			21	21
71 x 47	60	7	12	12			
73 x 55	66	12	18			20	20
77 x 52	66	8	12		12		
81 x 59	72	14	18		17		17
83 x 57	72	9	12		12		
87 x 63	78	14	18			17	17
95 x 67	84	16	18			17	17
103 x 71	90	16	18			17	17
112 x 75	96	18	21			17	17
117 x 79	102	18	21			16	16
128 x 83	108	18	24			16	16
137 x 87	114	18	24			16	16
142 x 91	120	18	24			16	16

ALUMINUM					
PIPE ARCH SIZE SPAN x RISE INCHES	EQUI- VALENT DIAMETER INCHES	MINIMUM CORNER RADIUS INCHES	MINIMUM COVER INCHES	2½" x ½" CORRUGATIONS	
				METAL THICKNESS (INCH/GAGE)	
				MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE (FEET)	
17 x 13	15	3	12	13	
21 x 15	18	3	12	12	
24 x 18	21	3	12	13	
28 x 20	24	3	12	13	
35 x 24	30	3	12	12	
42 x 29	36	3.5	15	12	
49 x 33	42	4	15	12	
57 x 38	48	5	15	12	
60 x 46	54	8	15		21
64 x 43	54	6	18	12	
66 x 51	60	9	18		21
73 x 55	66	12	18		20
81 x 59	72	14	21		17
87 x 63	78	14	21		17
95 x 67	84	16	24		17
103 x 71	90	16	24		17

NO SCALE

# COUPLING BANDS FOR METAL PIPE CULVERT <sup>2/</sup>

CORROSION SIZE <sup>3/</sup> INCHES	ROUND PIPE DIAMETER INCHES	PIPE ARCH SPAN X RISE INCHES	MINIMUM BAND WIDTH (INCHES)		
			ANNULAR CORRUGATED BANDS <sup>3/</sup>	HELICALLY CORRUGATED BANDS <sup>4/</sup>	SEMI-CORRUGATED BANDS <sup>5/</sup>
1½" x ¼"	underdrain <sup>6/</sup>	-	10.5	7	10.5
	12 to 36	17" x 13 to 42" x 29	7	12	
	42 to 72	49" x 33 to 83" x 57	10.5	12	
2½" x ½"	78 to 84	-	10.5	12	10.5
	36 to 72	60" x 46 to 81" x 59	12	14	10.5
	78 to 144	87" x 64 to 142" x 91	12	14	10.5
3 x 1	36 to 72	60" x 46 to 81" x 59	20	22	
	78 to 144	87" x 64 to 142" x 91	20	22	

<sup>2/</sup> Fabricate annular, helical and semi-corrugated type coupling bands from the same metal as the connecting pipe. Provide coupling bands not more than 3 nominal sheet thicknesses thinner than the thickness of the pipe to be connected, and no thinner than 0.052 inch for steel or 0.048 inch for aluminum. Fasten coupling bands with the following diameter of bolt:

- ¾" for 18" round culvert (21" x 15" pipe arch) or less
- 1½" for 21" round culvert (24" x 18" pipe arch) or more

<sup>3/</sup> For helically corrugated pipe with rerolled ends, the nominal corrugations size refers to the dimension of the end corrugation in the pipe.

<sup>4/</sup> Use annular corrugated bands with pipes having annular corrugations or with helical pipe ends rerolled with 3" x 1" corrugations. A 10.5 inch band is acceptable on pipe ends rerolled with 3" x 1" corrugations. A 12 inch band is acceptable on pipe ends rerolled with 3" x 1" pipe corrugations.

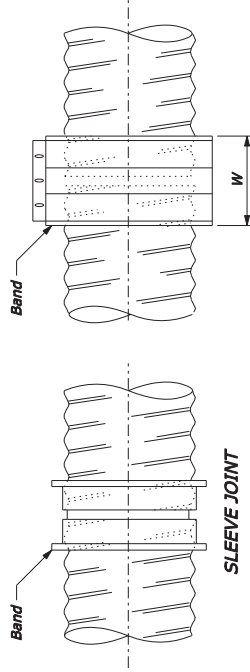
<sup>5/</sup> Use helical corrugated bands with pipes having helically corrugated ends.

<sup>6/</sup> The minimum band widths shown for 3" x 1" and 5" x 1" corrugated sizes apply to 2½" x ½" corrugations on rerolled pipe ends.

<sup>7/</sup> Smooth sleeve-type couplers and flat bands may be used for pipe diameters of 12" or less. Use a matching metal having a nominal thickness of not less than 0.040 inch for steel, or 0.036 inch for aluminum, or a plastic with an equivalent strength to metal.

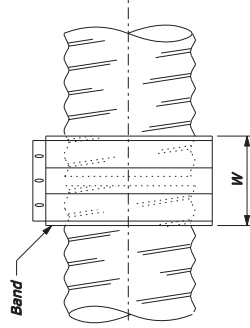
## NOTE:

1. Watertight pipe joints are not required unless specified in the Special Contract Requirements.
2. Other types of coupling bands or fastening devices that comply with the joint performance criteria of AASHTO Standard Specification for Highway Bridges, Division II Section 26 may be used.

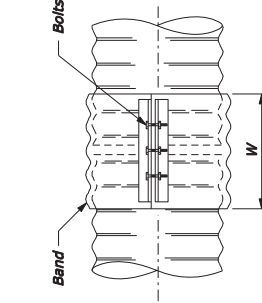
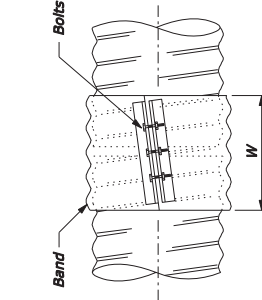
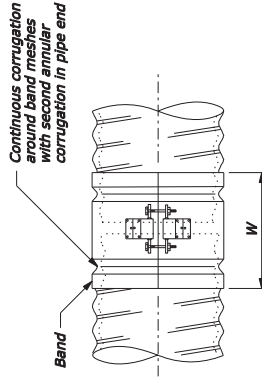


**SLEEVE JOINT**  
Smoother sleeve with center stop.  
Stab type joint

## SMOOTH SLEEVE BAND



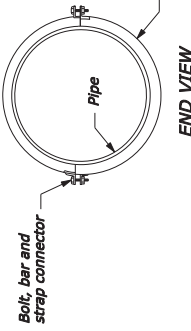
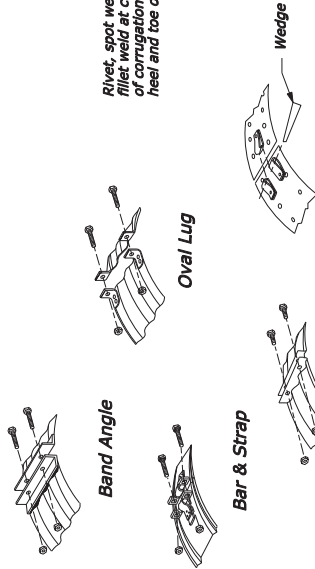
## FLAT BAND



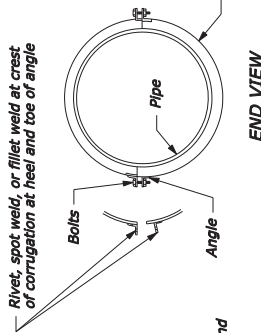
SIDE VIEW

SIDE VIEW

SIDE VIEW



## SEMI-CORRUGATED BAND



Second angle connection optional to 42" diameter, required above 42" diameter

SIDE VIEW

SIDE VIEW

SIDE VIEW

Second angle connection optional to 42" diameter, required above 42" diameter

## STANDARD BAND CONNECTIONS

## ANNULAR BAND

## HELICAL BAND

NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION  
WASHINGTON, D.C. 20541

U.S. CUSTOMARY STANDARD

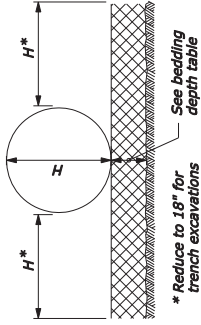
## METAL PIPE CULVERT COUPLING BAND

STANDARD APPROVED FOR USE 12/1993  
REVISED: 4/1994 6/2005  
STANDARD 602-2

**NOTE:**

- When directed, camber pipe culverts upward from a chord through the inlet and outlet invert an ordinate amount equal to 1% of the pipe length. Develop camber on a parabolic curve. If the midpoint elevation of the inlet invert, reduce the designed exceeds the elevation of the inlet invert, reduce the amount of camber or increase the pipe culvert gradient.
- H equals the diameter of all round pipe culverts or the rise dimension of all pipe arch culverts.

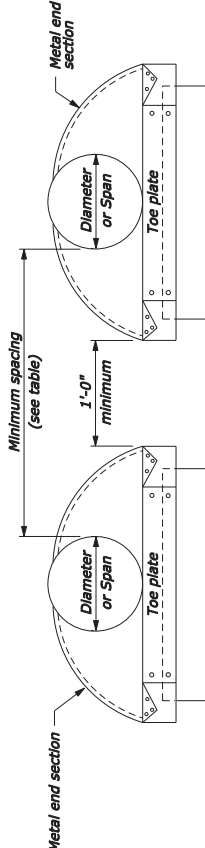
BEDDING DEPTH	
PIPE SIZE (H)	DEPTH
12" to 54"	4"
> 54"	6"



**PIPE BEDDING**

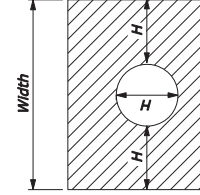
MINIMUM SPACING	
DIAMETER or SPAN UP to 48"	SPACING 24"
48" and UP	Half diameter or span OR 36" whichever is less

\* Reduce to 18" for trench excavations

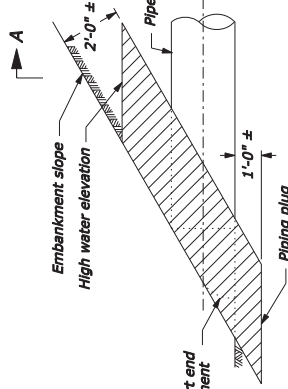


**ELEVATION**

**MULTIPLE PIPE INSTALLATION**



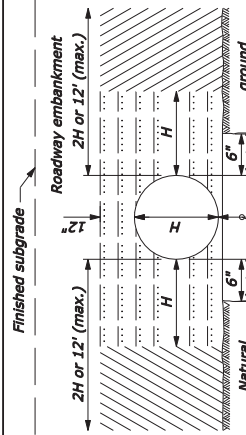
**SECTION A-A**



Construct piping plug of impermeable backfill material at the pipe culvert inlet where granular material is used for backfill. Width may be adjusted to tie into impervious material.

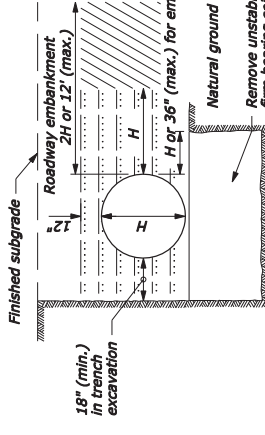
**PIPING PLUG**

NO SCALE



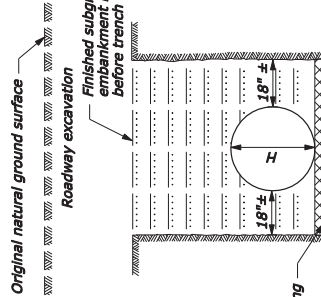
Remove unyielding material and replace with selected fine compressible material. Lightly compact in layers not over 6" in uncompacted depth.

**ON UNYIELDING MATERIAL**

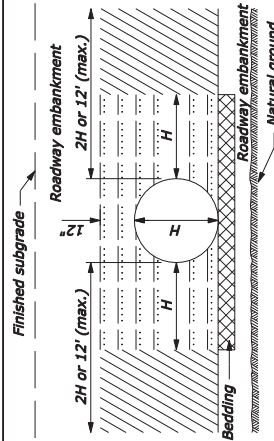


Remove unstable material to firm bearing soil and replace with approved granular foundation fill material properly compacted

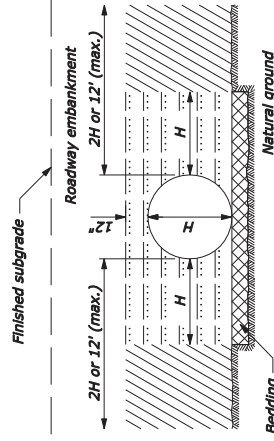
**ON UNSTABLE MATERIAL**



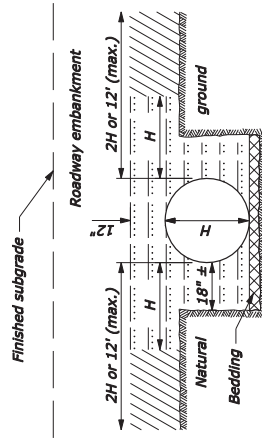
**BELOW NATURAL GROUND OR TRENCH EXCAVATION IN EMBANKMENT**



**ABOVE NATURAL GROUND**



**ON NATURAL GROUND**



**ABOVE AND BELOW NATURAL GROUND**



Embankment material placed in layers not exceeding 6" compacted depth.  
 Compacted backfill material placed in layers not exceeding 6" compacted depth meeting the following:  
 Metal Pipe: Maximum particle size = 3"  
 Soil Classification: A-1, A-2, or A-3  
 Plastic Pipe: Maximum particle size = 1 1/2"  
 Soil Classification: A-1, A-2, A-2-4, A-2-5, or A-3  
 Or lean concrete backfill in accordance with Section 614.

U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION  
FEDERAL LANDS HIGHWAY

**METAL AND PLASTIC PIPE CULVERT BEDDING**

STANDARD APPROVED FOR USE 12/1993  
REVISED: 4/1994 6/2005  
STANDARD 602-3



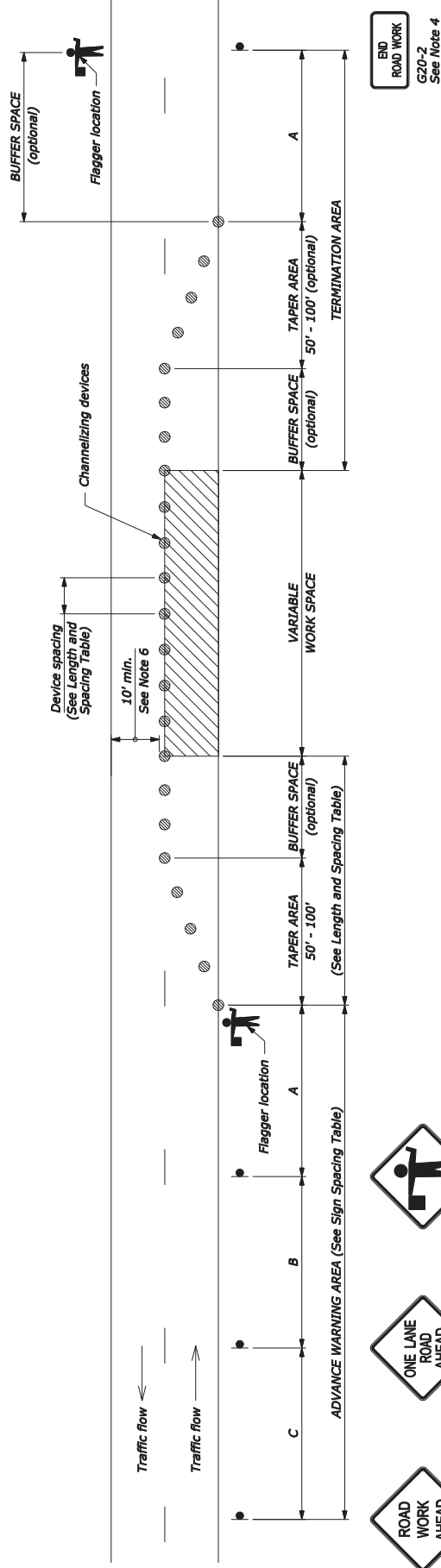
SIGN SPACING TABLE				
ROAD TYPE	DISTANCE BETWEEN SIGNS IN FEET			
	A	B	C	
Urban and Rural 30 MPH and less	100	100	100	
Urban and Rural 35 MPH to 50 MPH	350	350	350	
Rural greater than 50 MPH	500	500	500	
Expressway / Freeway	1000	1500	2640	

LENGTH AND SPACING TABLE			
APPROACH SPEED*	BUFFER SPACE LENGTH	CHANNELIZING DEVICE	
		TAPER AREA	WORK SPACE
MPH	FEET	SPACING IN FEET	
20	115	20	40
25	155	20	50
30	200	20	60
35	250	20	70
40	305	20	80
45	360	20	90
50	425	20	100
55	495	20	110
60	570	20	120
65	645	20	130
70	730	20	140

\* Approach speed based on the regulatory posted speed, not the advisory speed.

# NOTE:

1. Signs are shown for one direction of travel only. Place devices similar to those depicted for the opposite direction of travel.
2. Final location and spacing of signs and devices may be changed to fit field conditions as approved by the CO.
3. For pilot car operation, mount the PILOT CAR FOLLOW ME (G20-4) sign at a conspicuous location on the rear of vehicle. Prominently display the name of the contractor on the pilot car.
4. If closure is completely within the project limits, eliminate the "ROAD WORK AHEAD" (W20-1) and "END ROAD WORK" (G20-2) signs.
5. For night time flagging operation, provide floodlighting at flagger stations.
6. For project specific minimum width, refer to the Special Contract Requirements, Section 156.
7. Do not allow equipment, materials, or vehicles to be parked or stored in the buffer space.



NO SCALE

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# Cross Sections

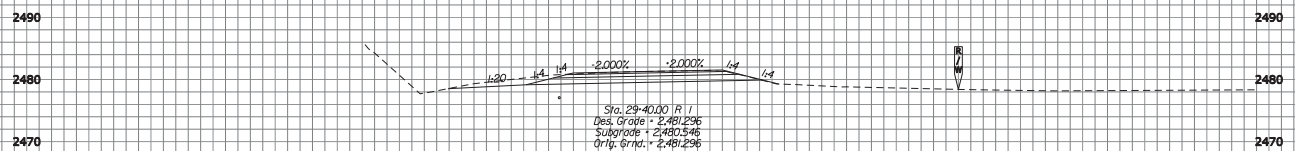
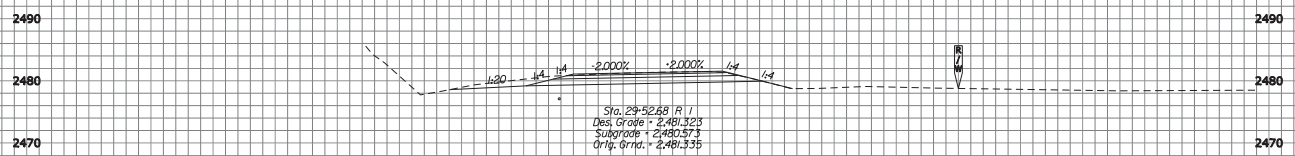
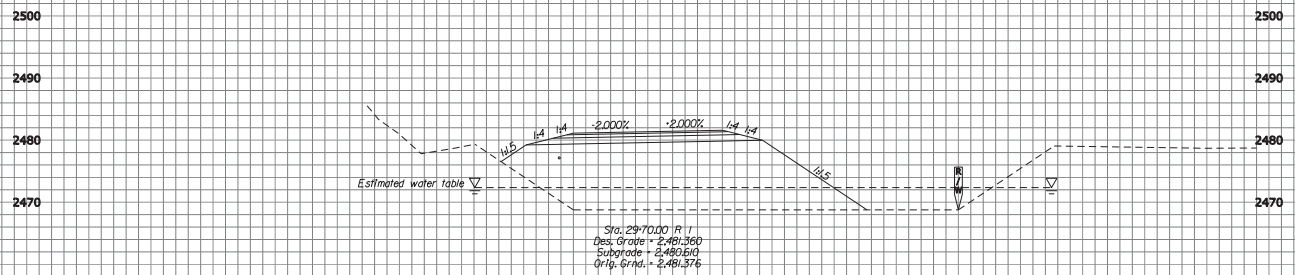
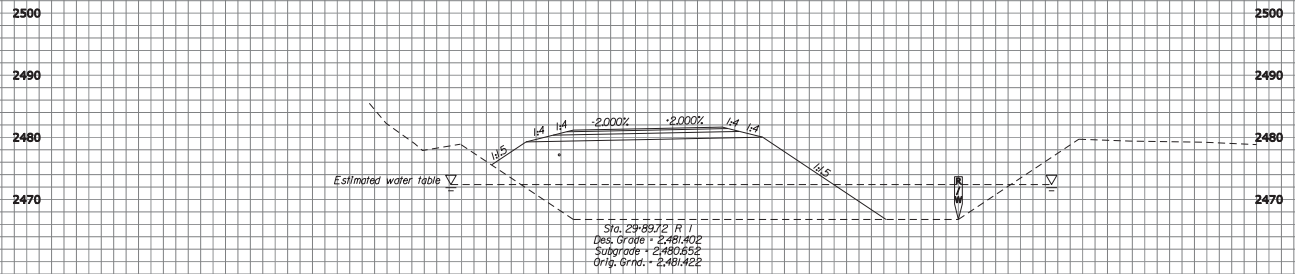
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Federal Highway Administration  
ID PFH 50(9); St. Joe River Road  
Avery Landing Cross Sections  
Sheet1

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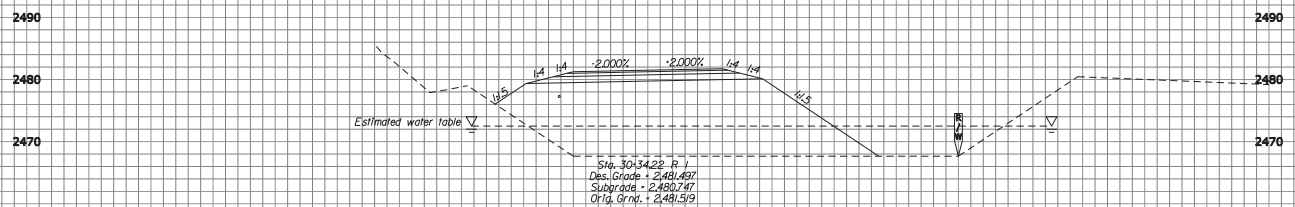
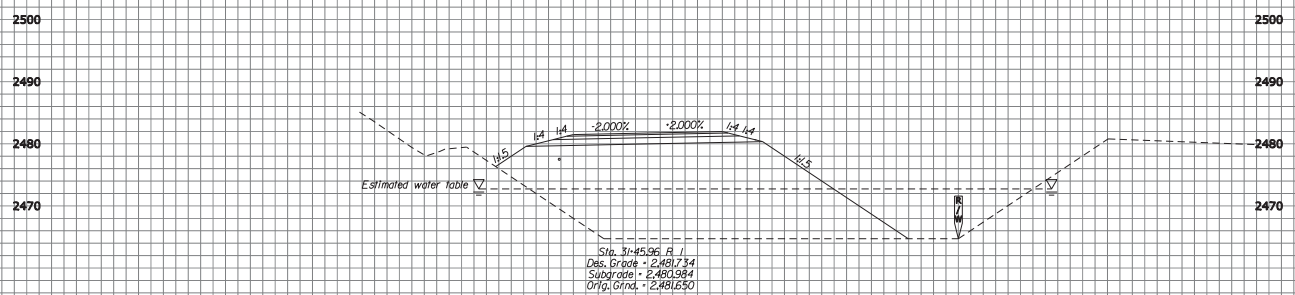
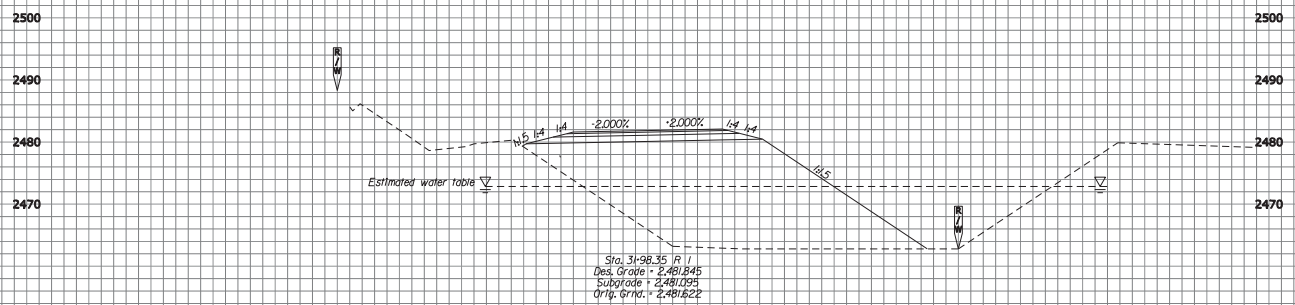
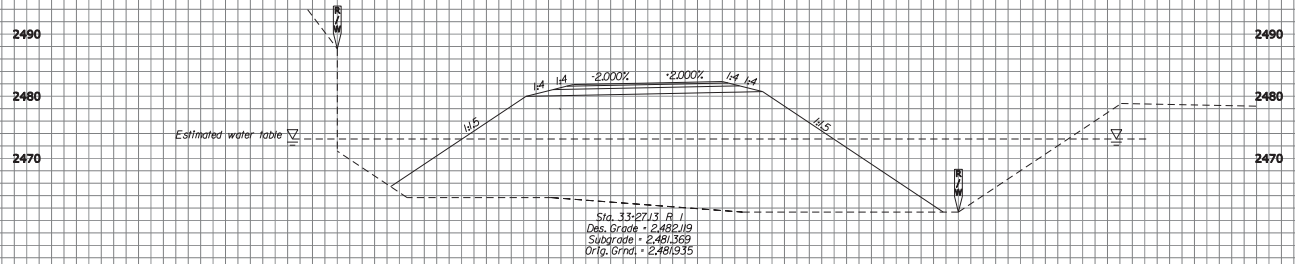


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# Federal Highway Administration ID PFH 50(9); St. Joe River Road Avery Landing Cross Sections Sheet2

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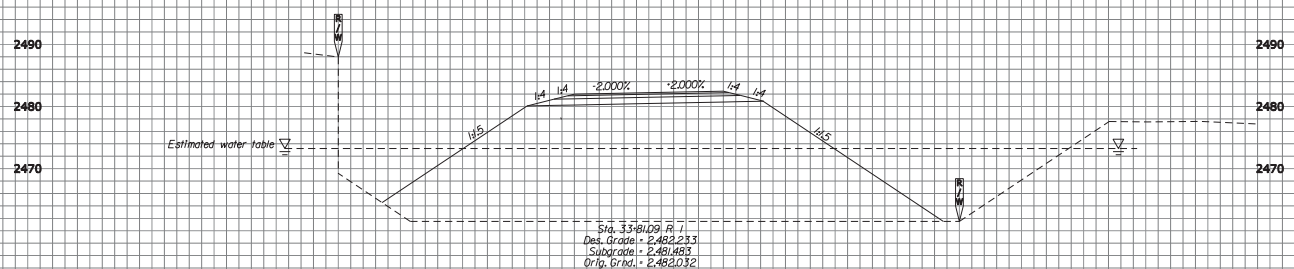
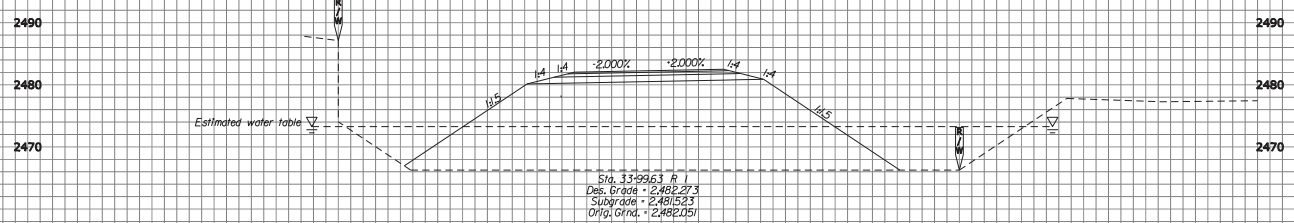
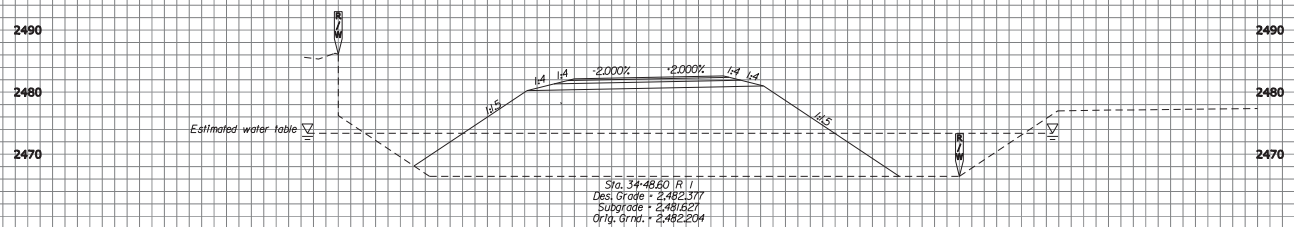
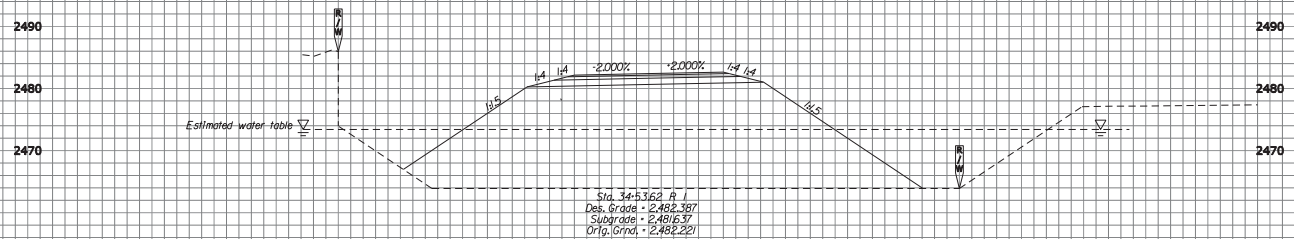


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# Federal Highway Administration ID PFH 50(9); St. Joe River Road Avery Landing Cross Sections Sheet3

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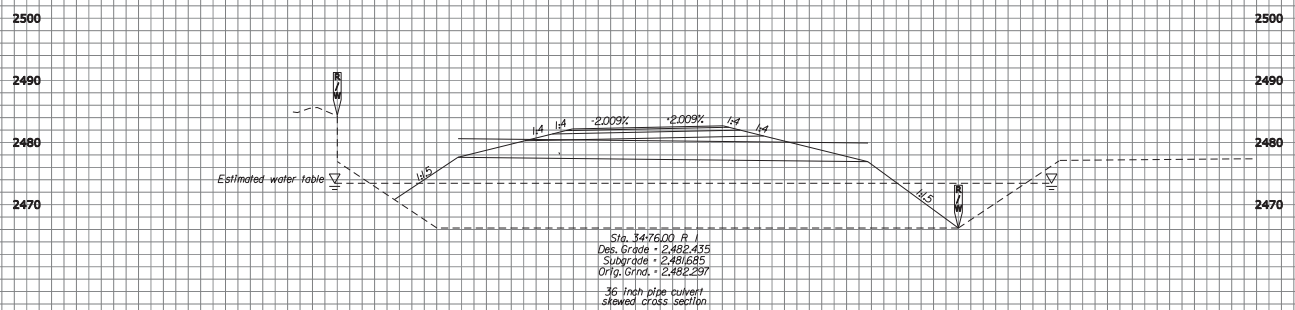
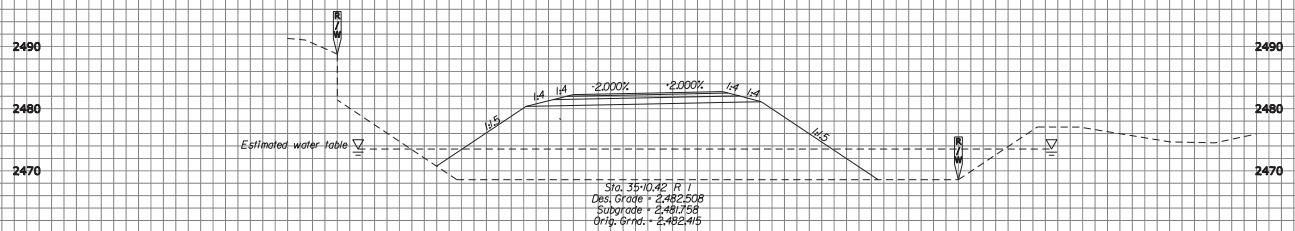
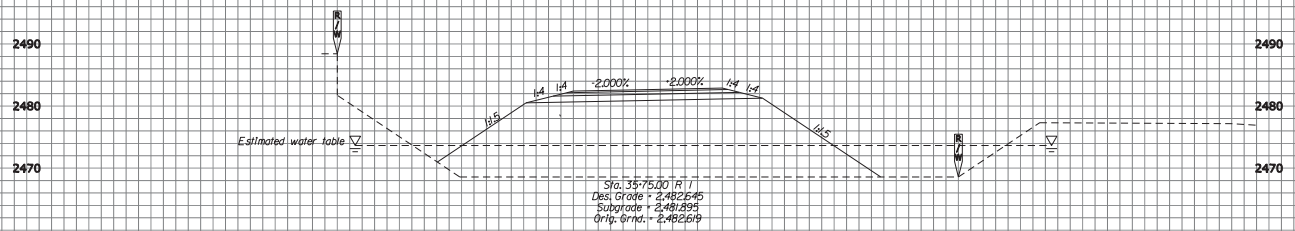
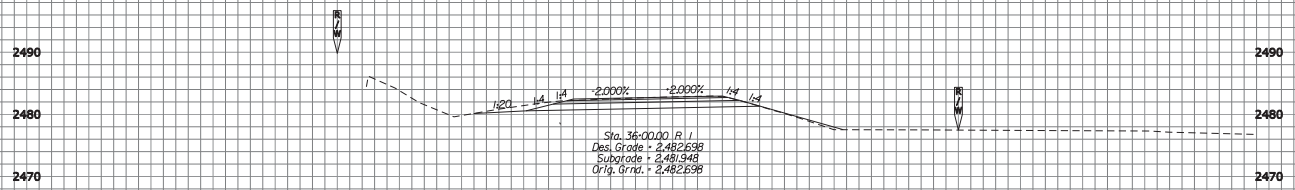


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# Federal Highway Administration ID PFH 50(9); St. Joe River Road Avery Landing Cross Sections Sheet4

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